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STD 22 Compact GYRO COMPASS and STD 22 GYRO COMPASS

Type 110-233

Installation and Service manual

3646/110-233.DOC010302 Edition: December 15, 2003

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Installation and Service manual
Compass STD 22
Compass STD 22 Compact

CONTENTS **Page**

Declaration of Conformity

Safety notes **1**

1 General information **2**
1.1 CAN bus (CAN = Controller Area Network) 10

2 Preparing to install the STD 22 Compact Gyro Compass **11**
2.1 STD 22 Compact Compass – Scope of Supply 11
2.2 General information concerning installation of the STD 22 Compact Compass 12
2.3 Creating cable connections 13
2.3.1 General information concerning on-board wiring 13
2.3.1.1 General information about creating an earth connection 15
2.4 Installing the compass and putting it into operation 16
2.4.1 Remove the transportation support with outer sphere, supporting liquid and distilled water. 16
2.4.1.1 Assembling the compass enclosure 17
2.4.1.2 Installation of the gyrosphere 20
2.4.1.3 Filling with distilled water and supporting liquid 22
2.4.1.4 Inserting the outer sphere in the compass enclosure 24
2.5 Creating cable connections and plug connections 26
2.5.1 Overview of plug connections and fuses on PCB‘s 26
2.5.1.1 Connecting the course receiver in the STD 22 Compact Gyro Compass 28
2.5.1.2 Connecting status and control signal outputs in the STD 22 Compact Gyro Compass 30
2.5.1.3 Connecting signal inputs for QS and SEC in the STD 22 Compact Gyro compass 32
2.5.1.4 Connecting the power supply cable 34
2.5.1.5 Connecting the compass to earth 35
2.6 Installation and commissioning of optional features 36
2.6.1 Installation and commissioning of the Additional Output Box 143-103 36
2.6.2 Installation and commissioning of the AC/DC Converter 121-062 38
2.6.3 Installation and commissioning of the Operator Unit Quick Settling (QS) 130-606 41
2.6.3.1 Installing the Operator Unit Quick Settling 42
2.6.4 Switching on, settling and adjustment 44
2.6.4.1 Switching on the compass 44
2.6.4.2 Checks on the compass 44
2.6.4.3 Setting the STD 22 Compact Compass into operation 46
2.6.4.4 Setting the compass zero (reference course) 48
2.6.4.5 Reading the alignment error 50
2.6.4.6 Setting Channel 1 and Channel 2 51
2.6.4.7 Setting the information source for Speed Error Correction 54
2.6.4.8 Adjustments of essential operating modes 56
2.6.4.9 Function check on externally connected course receivers 62

3	**Preparing to install the STD 22 Gyro Compass**	**65**
3.1	STD 22 Compass – Scope of Supply	65
3.1.1	General information concerning installation of the STD 22 Compass	66
3.2	Creating cable connections	67
3.2.1	General information concerning on-board wiring	67
3.2.1.1	General information about creating an earth connection	69
3.3	Installing the compass and putting it into operation	70
3.3.1	Remove the transportation support with outer sphere, supporting liquid and distilled water	70
3.3.1.1	Assembling the compass enclosure	71
3.3.1.2	Installation of the gyrosphere	74
3.3.1.3	Filling with distilled water and supporting liquid	76
3.3.1.4	Inserting the outer sphere in the compass enclosure	78
3.4	Creating cable connections and plug connections	80
3.4.1	Overview of plug connections and fuses on PCB‘s	80
3.4.2	Creating a cable connection from STD 22 Compass → Distribution Unit	82
3.4.2.1	Connecting to the power supply (Distribution Unit)	83
3.4.2.2	Connecting the CAN bus plug	84
3.4.2.3	Setting the jumpers for the CAN bus	85
3.4.2.4	Connecting the compass to earth	86
3.4.3	Switching on, settling and adjustment	87
3.4.3.1	Checks on the compass	87
3.4.3.2	Switching on the compass	89
3.4.3.3	Setting the compass zero (reference course)	91
3.4.3.4	Reading the alignment error	93
3.4.3.5	Setting the CAN bus address	94
3.4.3.6	Adjustments of essential operating modes	95
3.4.3.7	Function check on externally connected course receivers	101
4	**Fuses, jumper, LED‘s, buttons and plugs**	**103**
5	**DIP SWITCH settings**	**105**
5.1	Overview of functions of all DIP switch settings	106
5.1.1	7 segment displays and their meaning	110
5.1.2	Functional description of DIP switch settings (for general use)	111
5.1.3	Functional description of DIP switch settings (SEC)	143
6	**Tasks to be performed regularly**	**163**
6.1	Changing the supporting liquid and distilled water	163
6.1.1	Removing the outer sphere from the compass enclosure	163
6.1.1.1	Draining the supporting liquid and distilled water	163
7	**Error messages and warnings**	**168**
7.1	Error messages	168
7.2	Warnings	170
7.2.1	Warning 1 “Fan failure”	171
7.2.2	Warning 2 “Heater failure”	172
7.2.3	Warning 3 “Supporting liquid > 60°C”	172
7.2.4	Warning 4 “Supporting liquid level too low”	173
7.2.5	Warning 5 “Voltage cut-off”	173

ET-Catalogue
Annex 1-3
Zeichnungen:

Gyro Compass Dimensional Drawing	110 D 233 HP005
Gyro Compass STD 22 Cable and Connection Diagram	110-233 HP009 Sheets 1-3
Gyro Compass STD 22 Compact Cable and Connection Diagram	110-233 HP010
Additional Output Box Dimensional Drawing	146-103.HP005
Additional Output Box Wiring Diagram	146-103.HP007
AC/DC Converter Dimensional Drawing	121-062.HP005
Operator Unit Quick Settling Dimensional Drawing	130 E 606 HP005

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Konformitätserklärung des Herstellers
Artikel Nr. 10 der Richtlinie 96/98/EG

Manufacturer's Declaration of Conformity
Article 10 – EC-Directive 96/98/EC

Hiermit wird bestätigt, daß das nachfolgend aufgeführte Produkt dem baumustergeprüften Produkt entspricht und gemäß Qualitätssicherungs-Modul D erfolgreich getestet wurde.

This is to certify that the product identified below has been manufactured in accordance with type approved units and has been successfully tested according to the Quality Assurance Module D.

Produktbezeichnung/ Product Designation:	**Gyrocompass System /** **Gyrocompass System for High Speed Craft**
Typ / Type:	**Anschütz Gyro Compass Standard 22** (Systemkomponenten siehe Anlage/ system components see attached)
Baumusterprüfung durch/ Type Examination by:	GL Luxembourg 26, place de la Gare L-1616 Luxembourg Benannte Stelle Nr. 0801/ Notified Body No. 0801
Baumusterprüfbescheinigungen Nr./ Type Examination Certificates No.:	47778 - 03 Lux, 47779 - 03 Lux
Angewendete Normen und Richtlinien/- Applied Standards and Directives:	Directive 96/98EC / Additional Directive 2001/53/EC Additional Directive 2002/75/EC EN 61162-1, EN 60945, IEC 60945, IEC 61162-1 EN ISO 8728, ISO 16328 IMO Resolutions A.424 (XI), A.694 (17), A.813 (19) A.821(19), MSC.64 (67) Annex 4, MSC.97(73)

Diese Erklärung wird verantwortlich für den Hersteller abgegeben durch/
This declaration has been made in the name of the manufacturer by:

Kiel, den 17.11.2003

Raytheon Marine GmbH
Head of Quality Management

Martin Wloka

Raytheon Marine GmbH
Head of Qualification / Certification

Günther Krappe

EG-BPB/GL-47778-03Lux/47779-03Lux KE0029DE_031117.doc Seite 1 von 2

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Artikel Nr. 10 der Richtlinie 96/98/EG

Manufacturer's Declaration of Conformity
Article 10 – EC-Directive 96/98/EC

Anschütz Gyro Compass Standard 22

Auflistung der Systemkomponenten / Listing of the system components:

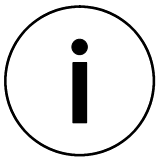
Gyro Compass	110-233
Gyrosphere	111-006
Operator unit	130-613
Distribution unit	138-118
Additional output box	146-103 NG001 [1]
AC DC Converter	121-062 [1]

[1] Optional

Safety notes

Caution:

- Maintenance and repair work should be carried out only by trained and qualified staff who are well versed in national safety regulations.
- After the gyro compass has been switched off it is necessary to wait at least 15 minutes before accessing the interior of the gyro compass. Otherwise the sphere could be damaged!



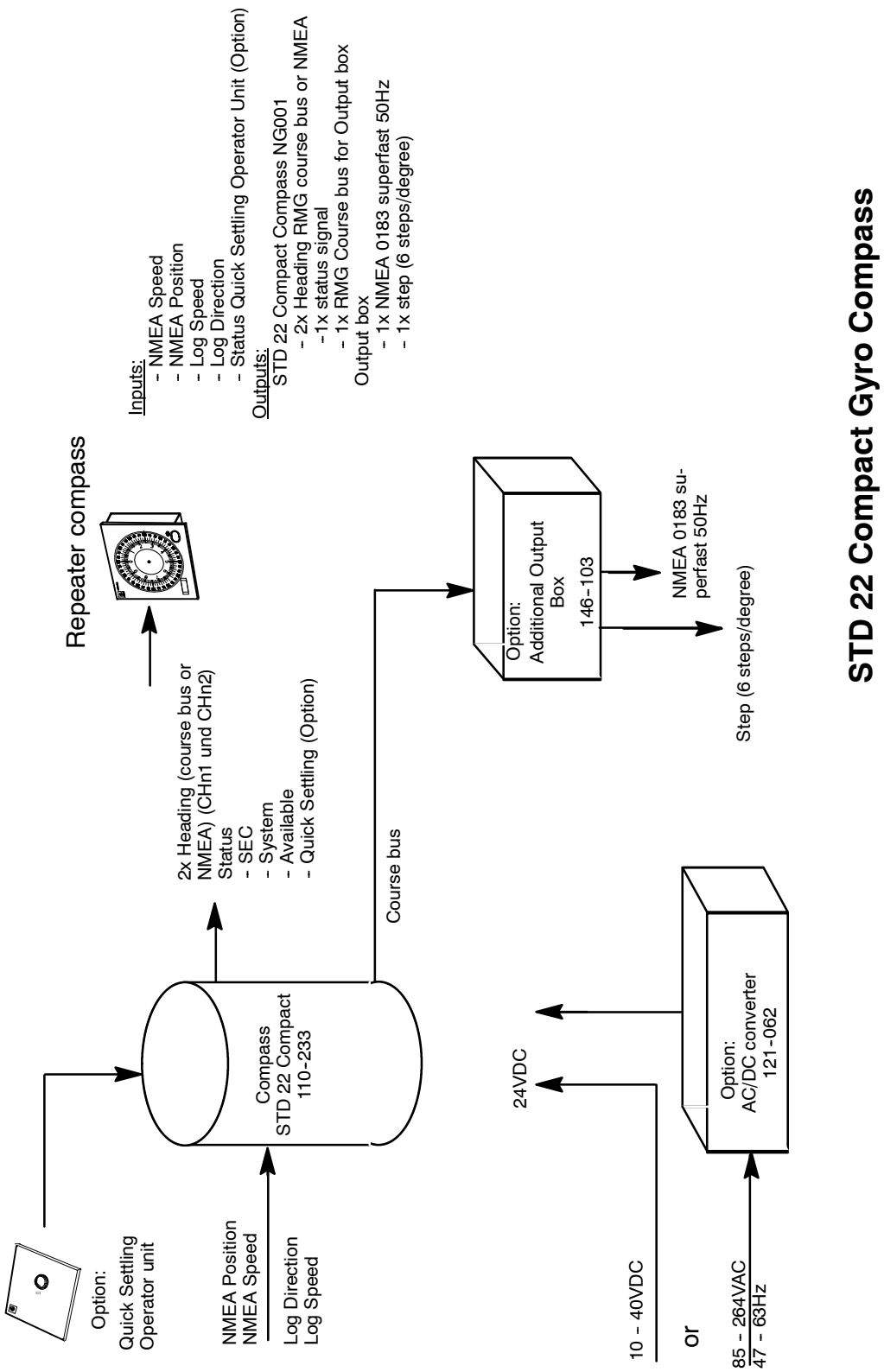
- It is advisable to leave the gyro compass switched on when lying in port for periods of up to one week.
- If warnings occur, the operation of the gyro equipment is not restricted. If the cause of the problem is rectified quickly, it is possible to prevent the equipment from breaking down. Please inform the authorised service staff (via the hotline). Refer to the service manual as appropriate.
- When error messages appear, the heading is no longer displayed on the compass; the heading is not followed up on a connected course receiver. The compass must be repaired by well trained staff.

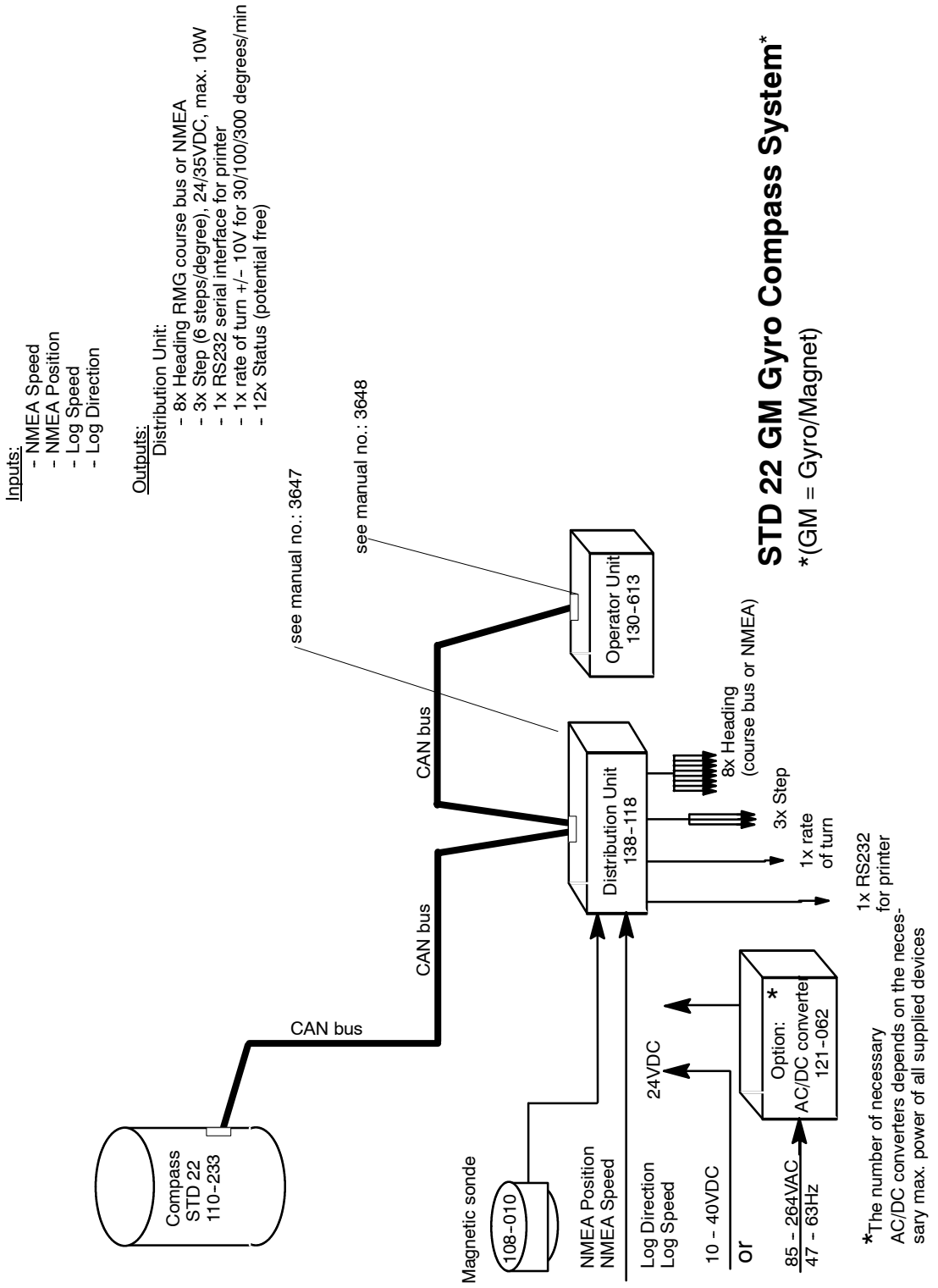
Installation and Service manual
Compass STD 22
Compass STD 22 Compact

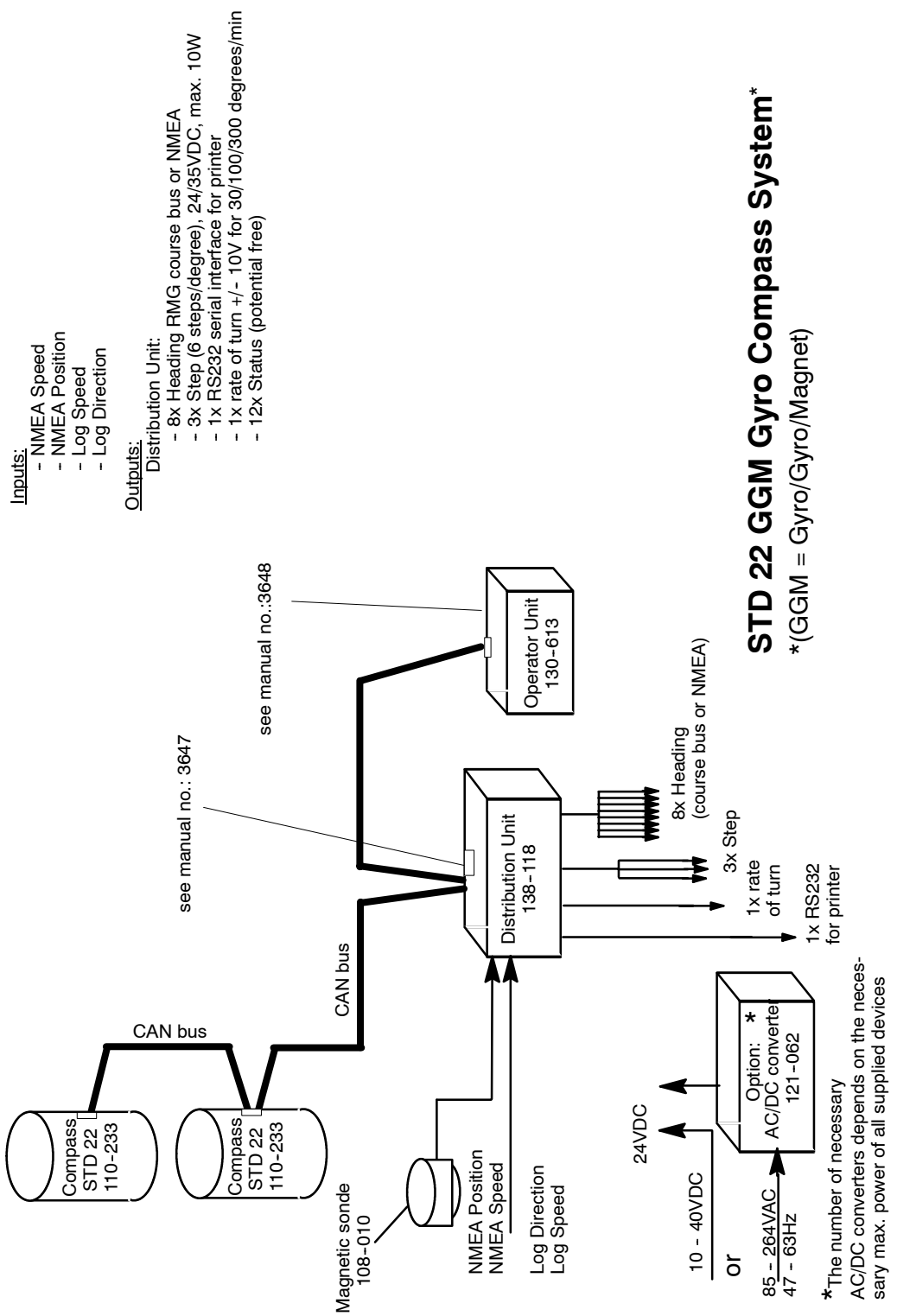
1 General information

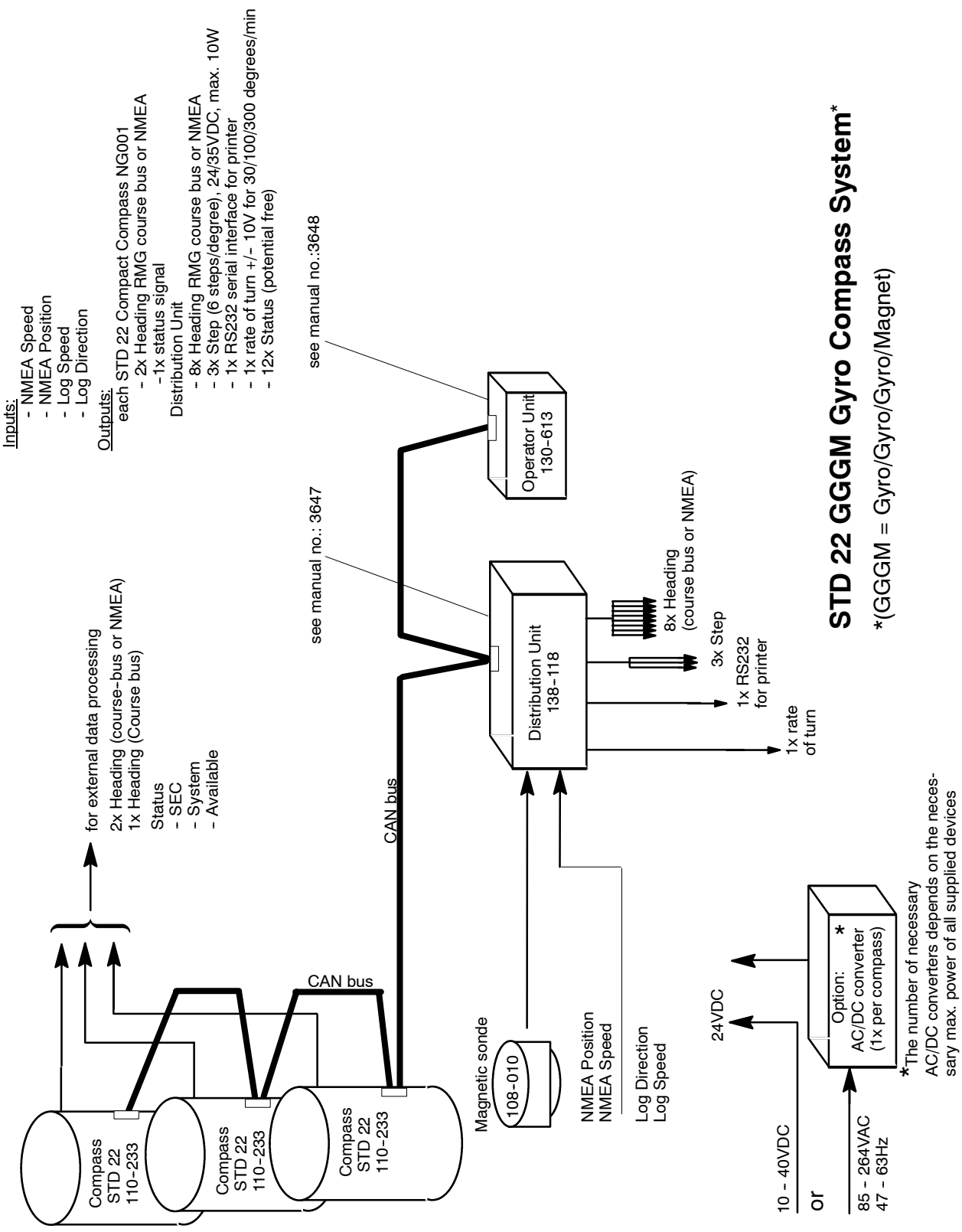
The STD 22 Compact Compass and the STD 22 Compass are identical gyro compasses.
The difference between the two gyro compasses is that the STD 22 Gyro Compass can be operated via a CAN bus system with an Operator Unit and a Distribution Unit.
In the case of the STD 22 Compact Gyro Compass, the CAN bus is not enabled.

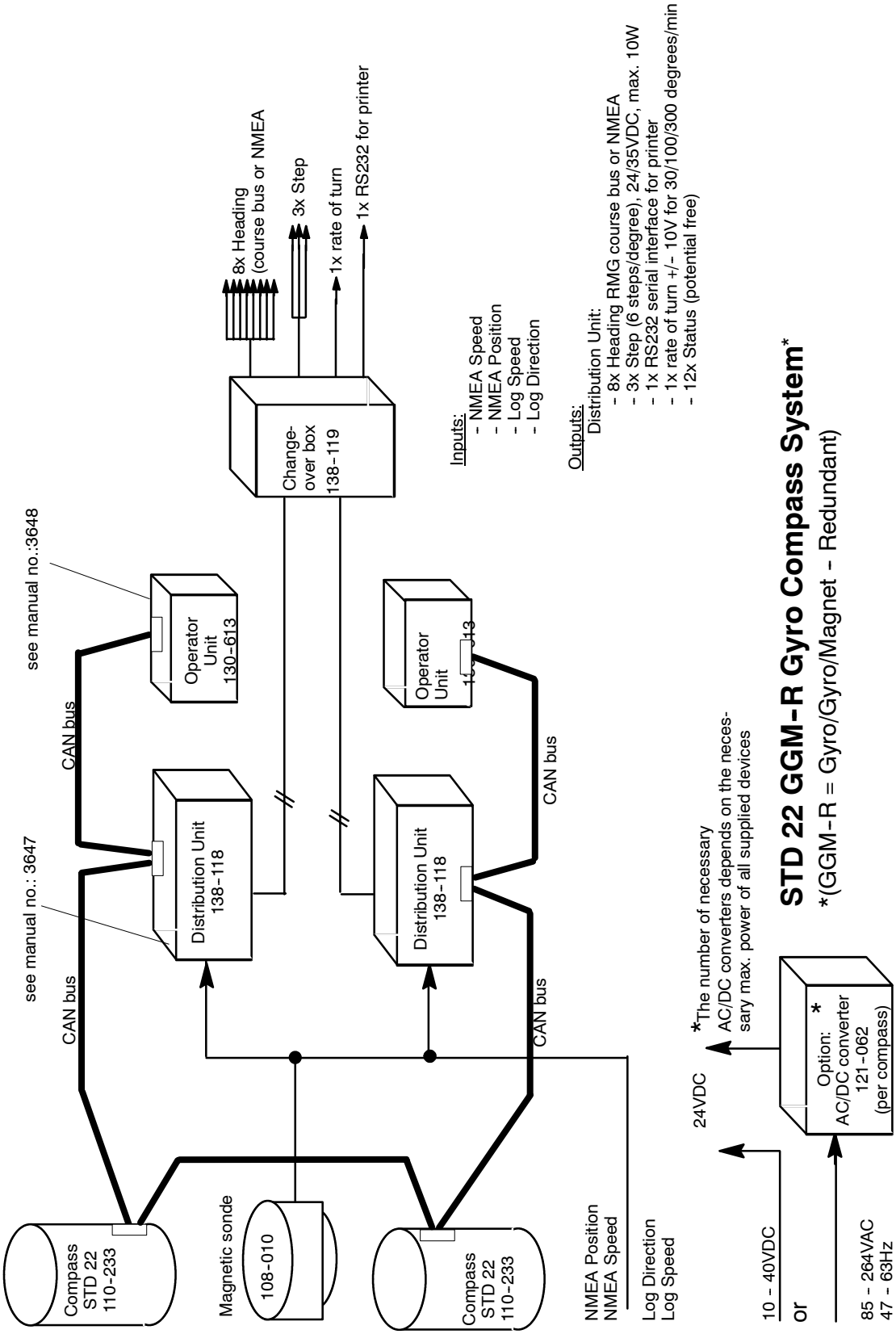
The following diagrams provide an overview of the possible applications of the STD 22 Compact and STD 22 Gyro Compasses.

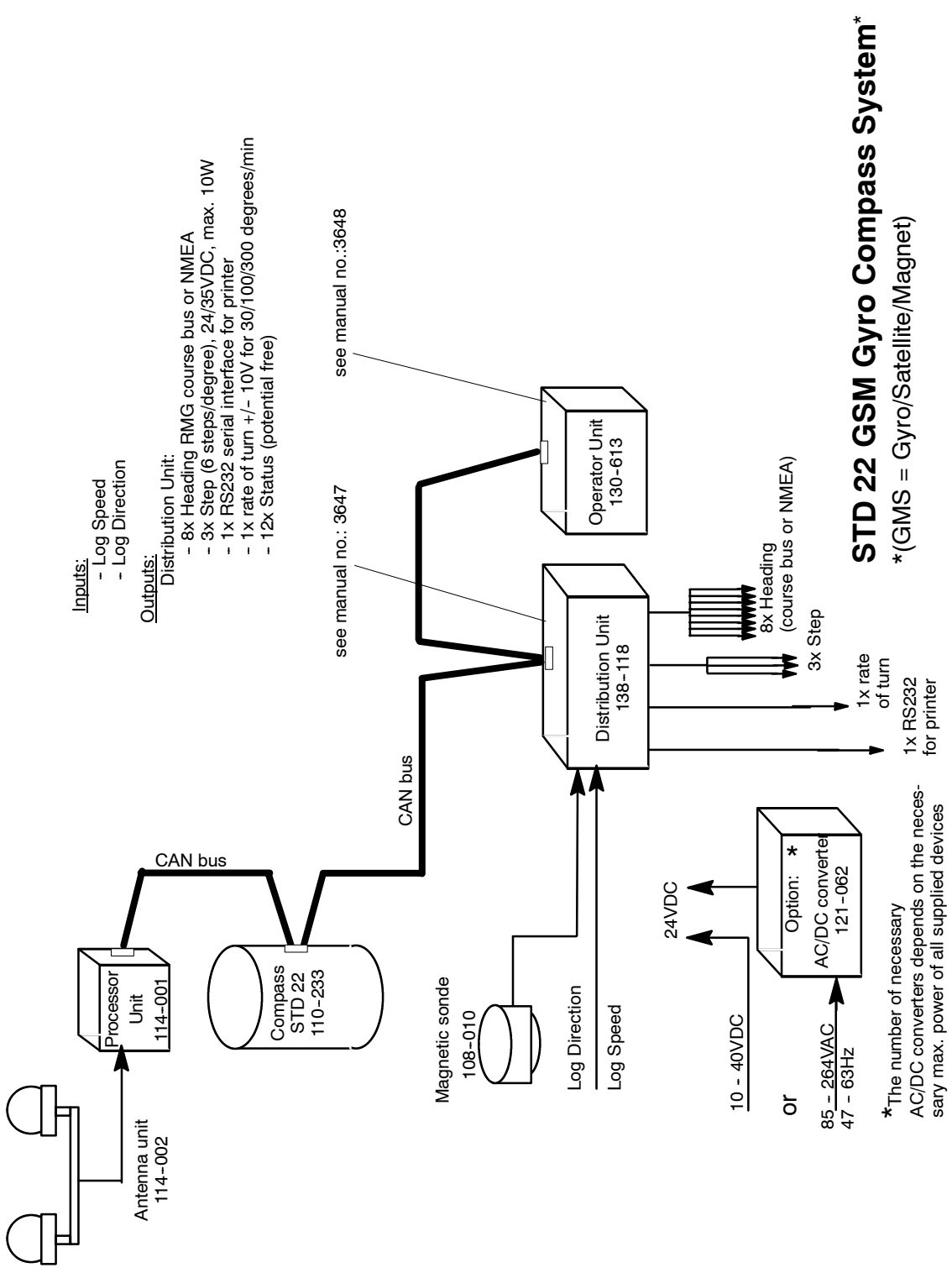

STD 22 Compact Gyro Compass
Inputs:
- NMEA Speed
- NMEA Position
- Log Speed
- Log Direction
- Status Quick Settling Operator Unit (Option)
Outputs:
STD 22 Compact Compass NG001
- 2x Heading RMG course bus or NMEA
-1x status signal
- 1x RMG Course bus for Output box
Output box
- 1x NMEA 0183 superfast 50Hz
- 1x step (6 steps/degree)
Repeater compass
2x Heading (course bus or NMEA) (CHn1 und CHn2)
Status
- SEC
- System
- Available
- Quick Settling (Option)
Course bus
Option: Additional Output Box 146-103
NMEA 0183 su-perfast 50Hz
Step (6 steps/degree)
Compass STD 22 Compact 110-233
24VDC
Option: AC/DC converter 121-062
Option: Quick Settling Operator unit
NMEA Position NMEA Speed
Log Direction Log Speed
10 - 40VDC
or
85 - 264VAC 47 - 63Hz

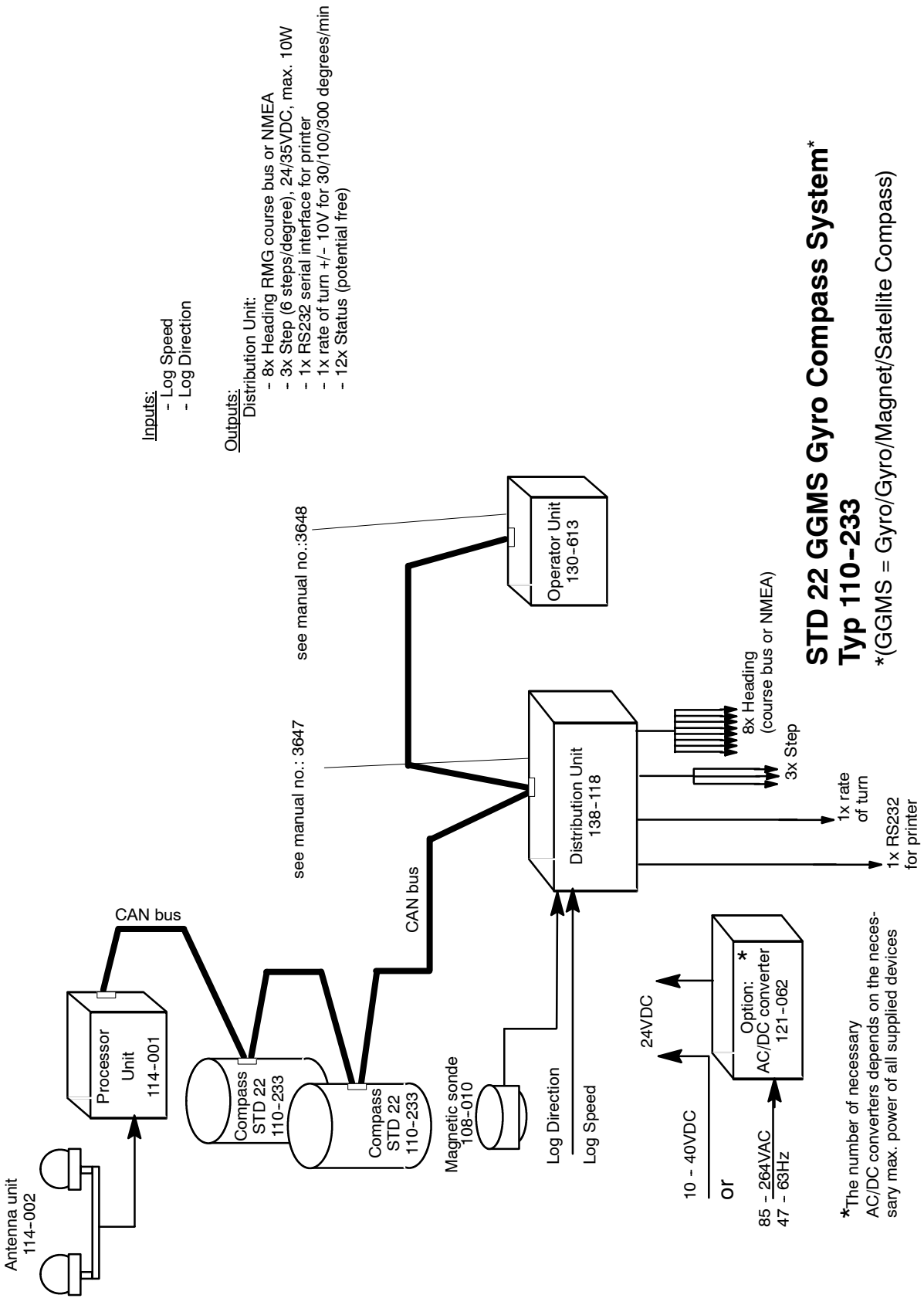

Inputs:
- NMEA Speed
- NMEA Position
- Log Speed
- Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/– 10V for 30/100/300 degrees/min
- 12x Status (potential free)
see manual no.: 3647
see manual no.: 3648
STD 22 GM Gyro Compass System*
*(GM = Gyro/Magnet)
Compass STD 22 110-233
CAN bus
CAN bus
CAN bus
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
Magnetic sonde
108-010
NMEA Position
NMEA Speed
Log Direction
Log Speed
24VDC
10 - 40VDC
or
85 - 264VAC
47 - 63Hz
Option: * AC/DC converter 121-062
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices


Inputs:
- NMEA Speed
- NMEA Position
- Log Speed
- Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
see manual no.:3648
see manual no.: 3647
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
CAN bus
CAN bus
Compass STD 22 110-233
Compass STD 22 110-233
Magnetic sonde 108-010
NMEA Position
NMEA Speed
Log Direction
Log Speed
24VDC
10 - 40VDC
or
85 - 264VAC
47 - 63Hz
Option: * AC/DC converter 121-062
STD 22 GGM Gyro Compass System*
*(GGM = Gyro/Gyro/Magnet)
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices


Inputs:
- NMEA Speed
- NMEA Position
- Log Speed
- Log Direction
Outputs:
each STD 22 Compact Compass NG001
- 2x Heading RMG course bus or NMEA
- 1x status signal
Distribution Unit
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
see manual no.:3648
Operator Unit
130-613
see manual no.: 3647
Distribution Unit
138-118
8x Heading
(course bus or NMEA)
3x Step
1x RS232
for printer
1x rate
of turn
for external data processing
2x Heading (course-bus or NMEA)
1x Heading (Course bus)
Status
- SEC
- System
- Available
CAN bus
CAN bus
Compass
STD 22
110-233
Compass
STD 22
110-233
Compass
STD 22
110-233
Magnetic sonde
108-010
NMEA Position
NMEA Speed
Log Direction
Log Speed
24VDC
Option: *
AC/DC converter
(1x per compass)
10 - 40VDC
or
85 - 264VAC
47 - 63Hz
*The number of necessary
AC/DC converters depends on the neces-
sary max. power of all supplied devices
STD 22 GGGM Gyro Compass System*
*(GGGM = Gyro/Gyro/Gyro/Magnet)

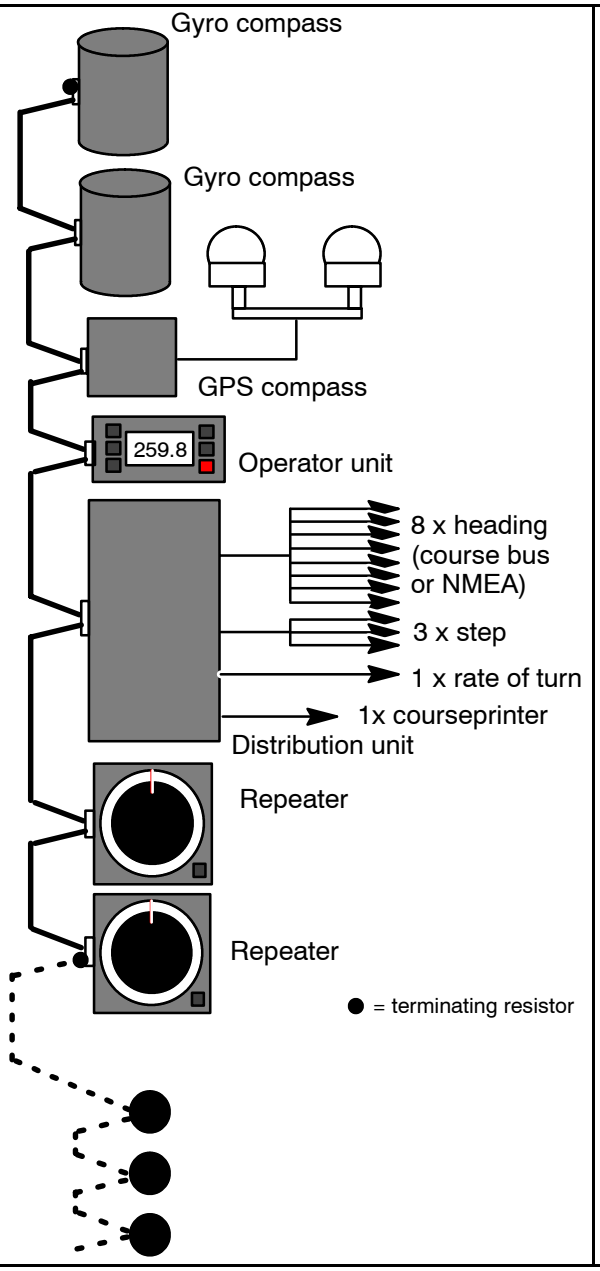

STD 22 GGM-R Gyro Compass System*
*(GGM-R = Gyro/Gyro/Magnet - Redundant)
8x Heading (course bus or NMEA
3x Step
1x rate of turn
1x RS232 for printer
Change-over box 138-119
Inputs:
- NMEA Speed
- NMEA Position
- Log Speed
- Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
see manual no.:3648
Operator Unit 130-613
Operator Unit
CAN bus
see manual no.: 3647
Distribution Unit 138-118
Distribution Unit 138-118
CAN bus
CAN bus
CAN bus
Compass STD 22 110-233
Magnetic sonde
108-010
Compass STD 22 110-233
NMEA Position
NMEA Speed
Log Direction
Log Speed
*The number of necessary AC/DC converters depends on the neces-sary max. power of all supplied devices
24VDC
Option: * AC/DC converter 121-062 (per compass)
10 - 40VDC
or
85 - 264VAC
47 - 63Hz


STD 22 GSM Gyro Compass System*
*(GMS = Gyro/Satellite/Magnet)
Inputs:
- Log Speed
- Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
see manual no.:3648
see manual no.: 3647
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
CAN bus
CAN bus
Processor Unit 114-001
Compass STD 22 110-233
Antenna unit 114-002
Magnetic sonde 108-010
Log Direction
Log Speed
24VDC
10 - 40VDC
or
85 - 264VAC
47 - 63Hz
Option: * AC/DC converter 121-062
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices


Inputs:
- Log Speed
- Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/– 10V for 30/100/300 degrees/min
- 12x Status (potential free)
STD 22 GGMS Gyro Compass System*
Typ 110–233
*(GGMS = Gyro/Gyro/Magnet/Satellite Compass)
see manual no.:3648
see manual no.: 3647
Operator Unit 130–613
Distribution Unit 138–118
8x Heading (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
CAN bus
CAN bus
Processor Unit 114–001
Compass STD 22 110–233
Compass STD 22 110–233
Magnetic sonde 108–010
Log Direction
Log Speed
24VDC
10 - 40VDC
or
85 - 264VAC
47 - 63Hz
Option: * AC/DC converter 121–062
Antenna unit 114–002
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices

1.1 CAN bus (CAN = Controller Area Network)

(CAN = Controller Area Network)



The CAN bus is a Multi-Master-Bus allowing the connection of all devices and systems regardless of their task and function. This means that any number of devices can be connected. These devices must be designed for CAN bus technology.
For the CAN bus it is essential that every bus user is addressable via a unique address. This address is set within each bus user.
The usable address range is from $01_{(16)}$ to $3F_{(16)}$ (address $00_{(16)}$ is reserved for development purposes).
Each bus user can send and receive data via the CAN bus.

The CAN bus must be terminated at both ends via an ohmic resistor (125 ohms). This terminating resistor is activated by jumpers on the respective PCB.

There are 2 redundant bus systems (CAN1 and CAN2).

Figure1 : Principle of CAN bus technology

2 Preparing to install the STD 22 Compact Gyro Compass

To ensure that the STD 22 Compact Gyro Compass is installed and put into operation correctly, these instructions must be followed in the order in which they appear.
It must not be installed or put into operation whilst at sea.

2.1 STD 22 Compact Compass – Scope of Supply

The scope of supply consists of:

- Compass (110-233)
  - Outer sphere
  - Distilled water
  - Supporting liquid
  - Gyrosphere (111-006)
- User manual for the STD 22 Compass
- Installation and service manual for the STD 22 Compass
- Tools and spare parts pack
  - Sealing rings
  - Suction cup
  - Filling device
  - Injector

Optional:

- AC/DC converter (121-062)
- Quick Settling Operator Unit (130-606)

- Additional Output Box (146-103)
  (Interface extension STEP/SSC)

2.2 General information concerning installation of the STD 22 Compact Compass

When fitting components, observe the following spacing:

Fit the compass enclosure so that the display can be viewed from above and the cover of the enclosure can be removed (see also Dimensional Drawing 110-133.HP005).

To ensure fault-free operation of the STD 22Compact Compass, it is essential to follow these directions, safety notes and installation instructions.

Instructions relating to cable cross-sections and earth connections must be adhered to.

The tools which are specified for installing the compass must be used.

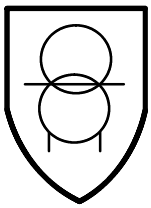
Only original parts or parts approved by the manufacturer may be used in connection with the STD 22 Compact Compass.

See also Cable Connection Diagram 110-233 HP010 for the STD 22 Compact Compass.

Gyro Compass should not be installed in oil-containing ambient air, not in surrounding in vibration and should installed on a vibration-free platform.

Gyro compass should be installed on the ships‘ line (vertical and horizontal).

The installation of the power supply (AC/DC-Converter) should only be performed by an experienced electrician.



The supply voltage has to be engineered as a low-security-voltage according to SELV.

The respective label at the power supply has to be observed.

2.3 Creating cable connections

2.3.1 General information concerning on-board wiring

The cables which are to be connected to the STD 22 Compact Gyro Compass are led through one of the cable entries at the top of the compass enclosure and fixed in the cable entry with a cable clip suitable for the size of the cable.
The cable entries are supplied with the compass.

Caution:
Ensure that cables are not live before creating cable connections.
It is vitally important to ensure that all cables are free of voltage; where appropriate, carry out voltage measurements beforehand and/or disconnect the relevant distributor from the power supply.

To ensure that the compass functions correctly, it is essential to adhere to the following sequence when creating cable connections.

- Strip the cable over a length of approximately 180 mm (depending on the distance of the cable entry from the terminal). Be careful not to damage the screening.
- Trim the screening so as to leave approximately 15 mm on the cable.

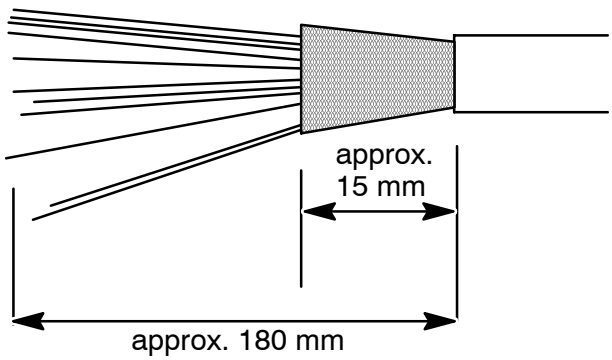


Figure 2: Requirements for stripping the connecting cable

- Push the components of the screw fastening over the cable.
  It is essential to follow the sequence (as shown in Figure 3).
- Check the cone and the mating piece of the earthing insert for corrosion and if necessary remove corrosion with an emery cloth.
- Push the mating piece of the earthing insert to the end of the cable sheath.
- Push the cone inside the screening and against the mating piece. Ensure that the screening is evenly distributed over the cone (see Figure 3).

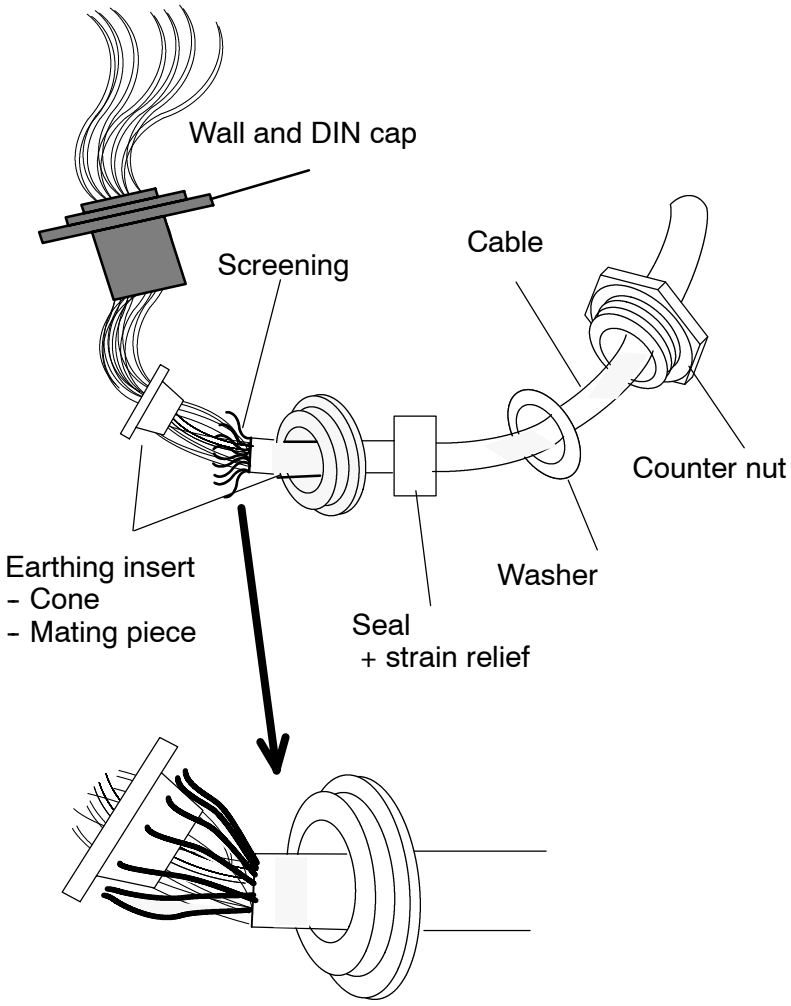
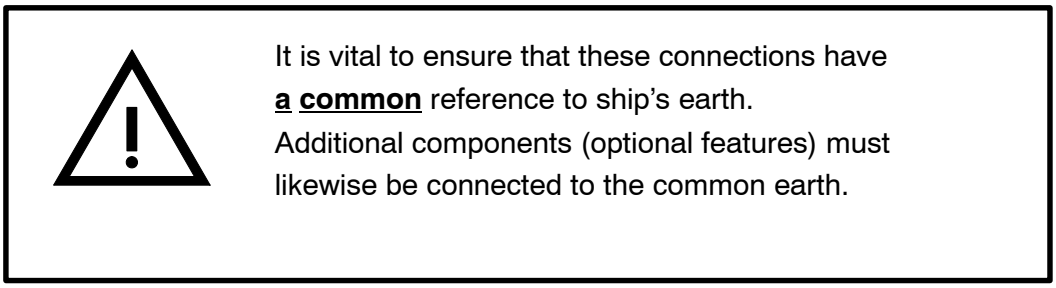


Figure 3: Creating the cable connection

- Place the earthing insert, strain relief and washer in the cable entry; fit and tighten the counter nut.
- Strip the cable conductors to a length of about 1.5 cm, lightly twist them and fit cable end sleeves. Connect the cable conductors according to respective drawings and tables. Tighten the terminal screws – check the connection is secure by pulling gently.

2.3.1.1 General information about creating an earth connection

The following instructions relating to the creation of cable connections must be adhered to in order to comply with the stringent EMC requirements.
The specified cable types must be used.


It is vital to ensure that these connections have
a common reference to ship's earth.
Additional components (optional features) must
likewise be connected to the common earth.

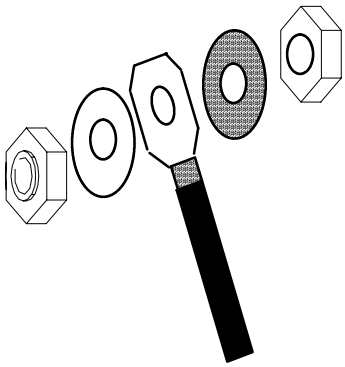


Figure 4: Creating an earth connection

Each earth connection must be made as shown in Figure 4.
The earth cable, to which a cable lug is attached, must have a cross-section of at least 1.5 mm^2.
The cable lug is mounted between a pair of toothed washers.
Earth connections must be free of all corrosion; they must be screwed tight.

2.4 Installing the compass and putting it into operation

2.4.1 Remove the transportation support with outer sphere, supporting liquid and distilled water.

- Undo the 4 screws (Figure 5 /1) at the top and bottom of the enclosure door, lift out the door and detach the earthing strip (Figure 5/2) on the inside of the door.
- Carefully remove the transport packaging with the outer sphere and the two bottles containing supporting liquid and distilled water from the compass enclosure.
- Take the outer sphere out of the transport packaging and place it on the base plate; the outer sphere must be secured to prevent it from tilting

Caution:
Danger of tilting!

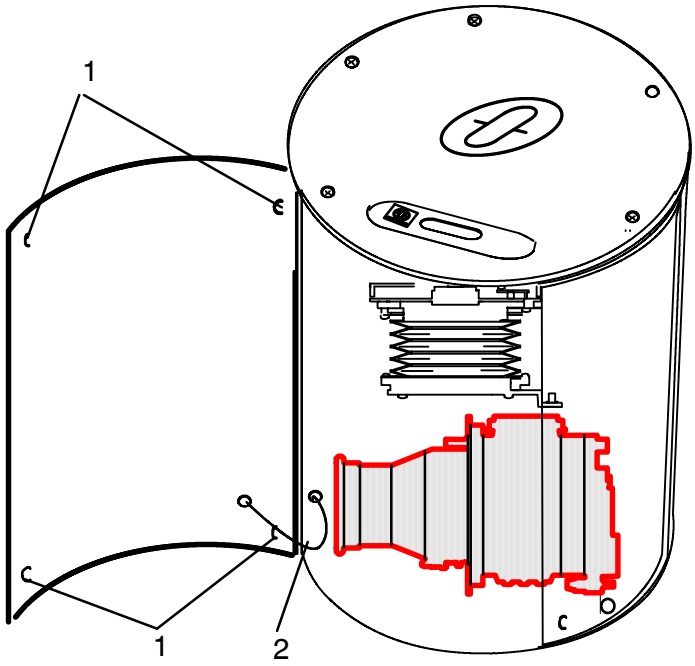


Figure 5: Principle of dismantling the enclosure door

2.4.1.1 Assembling the compass enclosure

Note: It is not necessary to install the compass enclosure with reference to the ship (e.g. in the ship's forward direction). It can be installed in whatever position is most convenient for servicing and operation.
The installation described below is to be regarded as the maker's recommendation.

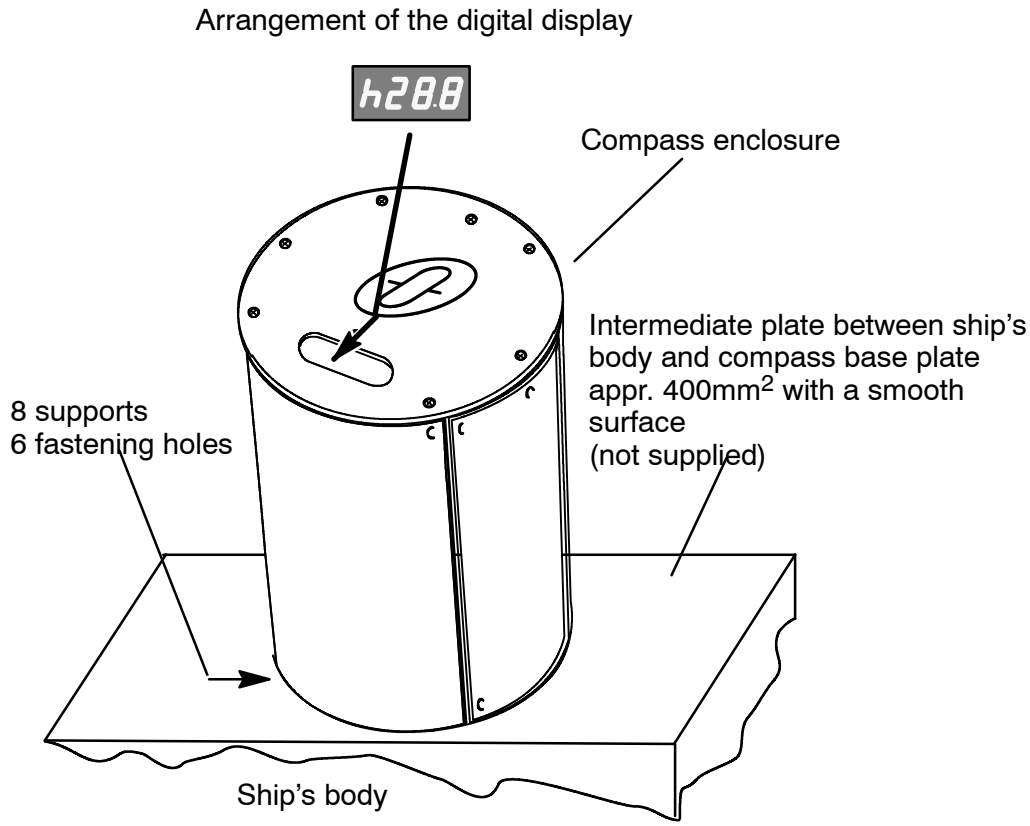

Arrangement of the digital display
Compass enclosure
Intermediate plate between ship's body and compass base plate appr. 400mm2 with a smooth surface (not supplied)
8 supports
6 fastening holes
Ship's body

Figure 6: Installation of the compass enclosure

The compass enclosure must be installed in such a way that the following requirements are met:

- The 8 supports must all stand on a flat, firm surface.
  If necessary, the user should himself create an intermediate plate (marine quality hardwood or metal) suited to the local conditions.
- The compass enclosure must be screwed to the intermediate plate in a sea-resistant fashion.
- The intermediate plate must also be screwed to the ship's body in a sea-resistant fashion; this fastening is the responsibility of the user of the STD 22 Compact himself.
- The compass enclosure must be mounted so that the digital display can be seen easily after installation, the door of the compass enclosure can be opened and closed easily and the cover of the compass enclosure can be detached.
- The fastenings of the compass enclosure are indicated in the dimensional drawing "Gyro Compass" (110 D 233 HP005) in the appendix to this manual.

The compass enclosure is fastened to the intermediate plate with 6 screws

- for woodscrews ∅11 x length depending on the thickness of the intermediate plate
- for metal screws M10 x length depending on the thickness of the intermediate plate.

The compass enclosure can also be mounted directly on a flat metal surface; in this case, suitable stud bolts (M10) must be welded on; alternatively the compass housing can be fastened on the underlying surface with threaded holes and screws M10-A4.

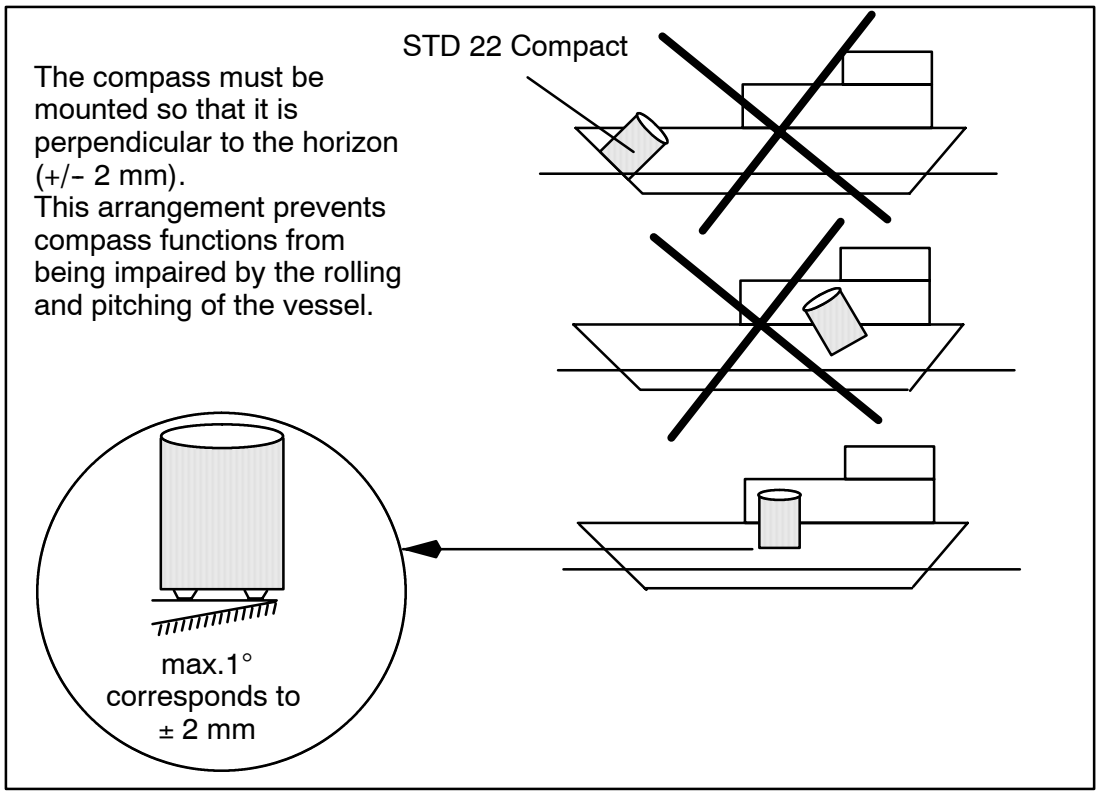

STD 22 Compact
The compass must be mounted so that it is perpendicular to the horizon (+/- 2 mm).
This arrangement prevents compass functions from being impaired by the rolling and pitching of the vessel.
max.1°
corresponds to
± 2 mm

Figure 7: Horizontal alignment for installation of the compass enclosure

2.4.1.2 Installation of the gyrosphere

Special tool required:
Suction cup

Installation procedure:

- Undo the six screws (Figure 8/1) fastening the upper and lower halves of the outer sphere (Figure 8/2 and 3).
- Remove both hose-pieces (Figure 8/4) from the pump.

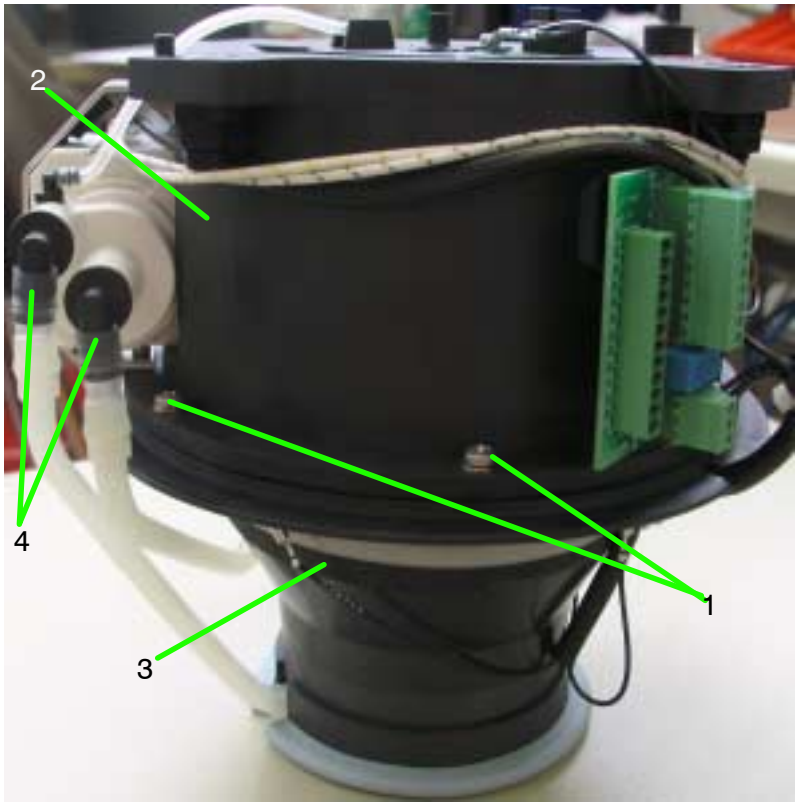


Figure 8: Outer sphere

- Remove the upper half of the outer sphere (Figure 8/2), paying attention to the cable loom from the lower outer sphere to the (Figure 8/3) small PCB (see Figure 9), take the gyrosphere (Figure 9/2) out of the transportation box and carefully insert it using the suction cup (Figure 9/3) in the lower outer sphere (see Figure 9).
- Replace the upper half of the outer sphere on the lower half.

Check that there is a proper seal between the two halves of the outer sphere (see Figure 9/1).

- Retighten the six screws (see Figure 8/1).
- Push both hose-pieces (Figure 8/4) to the pump again

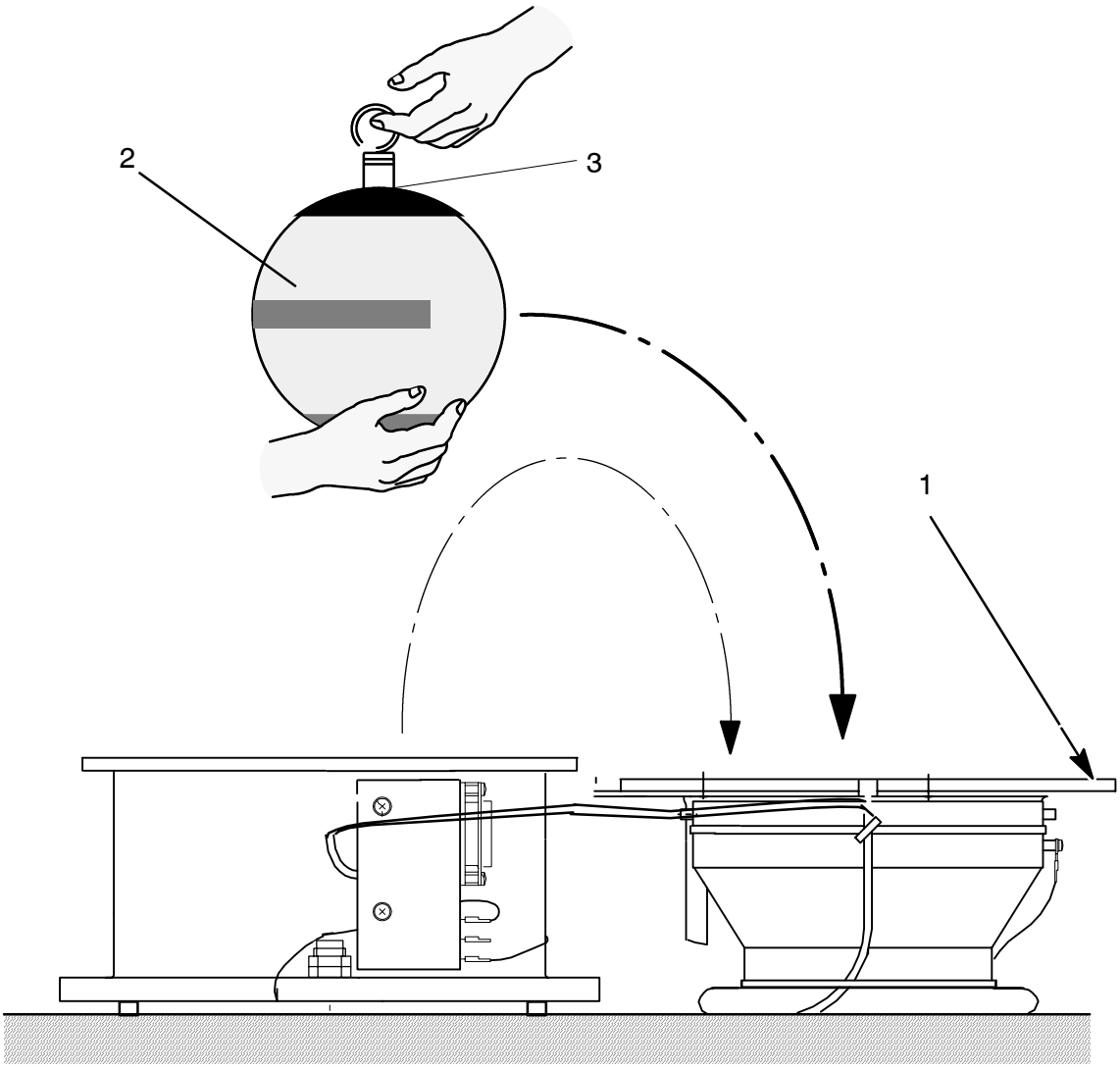


Figure 9: Principle of separating the upper and lower halves of the outer sphere – inserting the gyrosphere

2.4.1.3 Filling with distilled water and supporting liquid.

(see Figure 10)

- Undo the three plastic screws (Figure 10/1-3) on the upper outer sphere

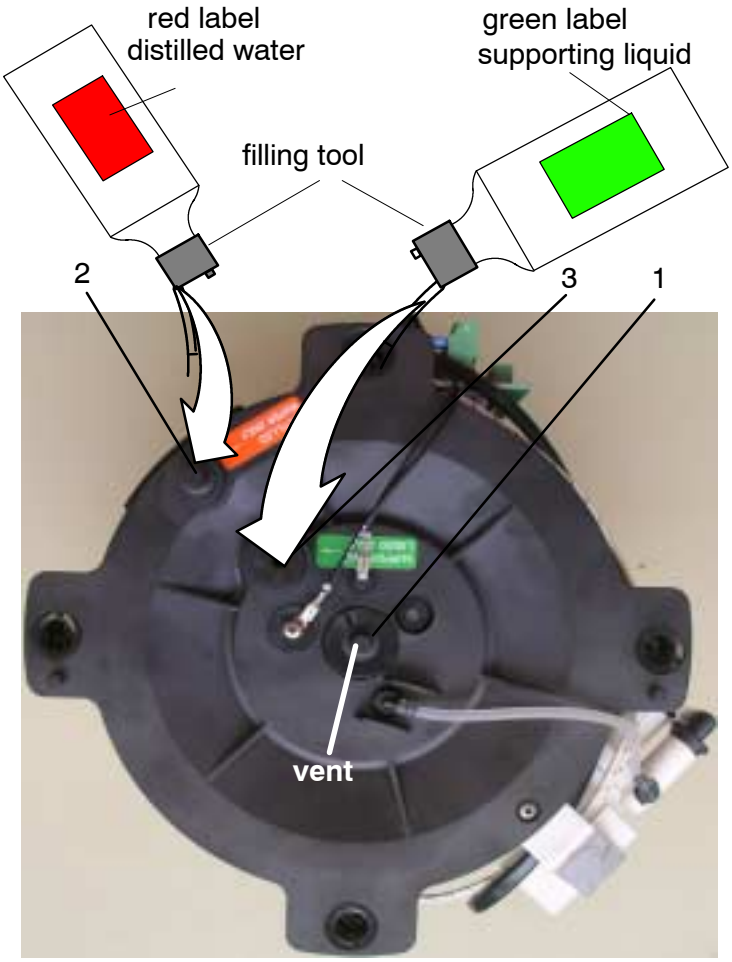
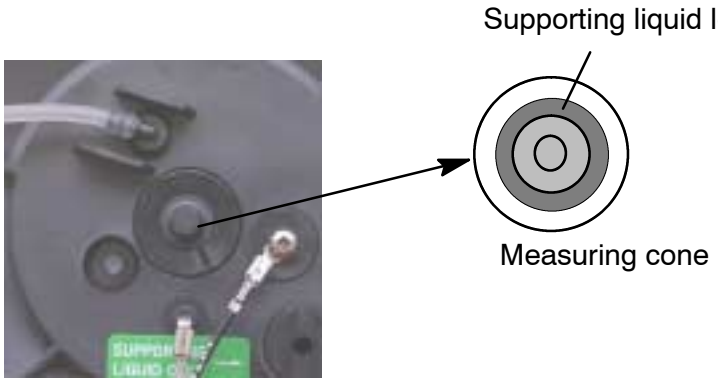


Figure 10: Filling with liquids

- Fit the supplied filling device on the distilled water bottle (red label).
- Pour in all the distilled water (230 cm^3) (look for the identifying label on the outer sphere).
- Re-close the distilled water filling opening with the screw, check that it is properly sealed.
- Remove the filling device from the distilled water bottle and attach it to the supporting liquid bottle (green label).

- Pour approximately 840 cm^3 of supporting liquid in the appropriate filling opening (look for the identifying label).
  The supporting liquid must be at room temperature (over 25° C) and the measuring cone should fill half the measuring range (diameter).
  The following photograph shows the measuring cone for the liquid level.



This picture only shows the situation at the start of operation (after filling for the first time or after changing the supporting liquid); during operation, the dark circle in the measuring cone is smaller.

Figure 11: Measuring cone for supporting liquid level

- Discard any unused supporting liquid; no special measures are needed for disposal.
- Re-close the filling opening for supporting liquid, check that it is properly sealed.
- Re-insert the ventilation screw, check that it is properly sealed.

2.4.1.4 Inserting the outer sphere in the compass enclosure

(see Figure 12)

- Carefully insert the gyrosphere in the compass enclosure:

> Pay attention to the two locking pins on the closure.

- Using both hands, hold the outer sphere and guide it under the snap closures (Figure 12/1) on the pendulum joint (Figure 12/2).

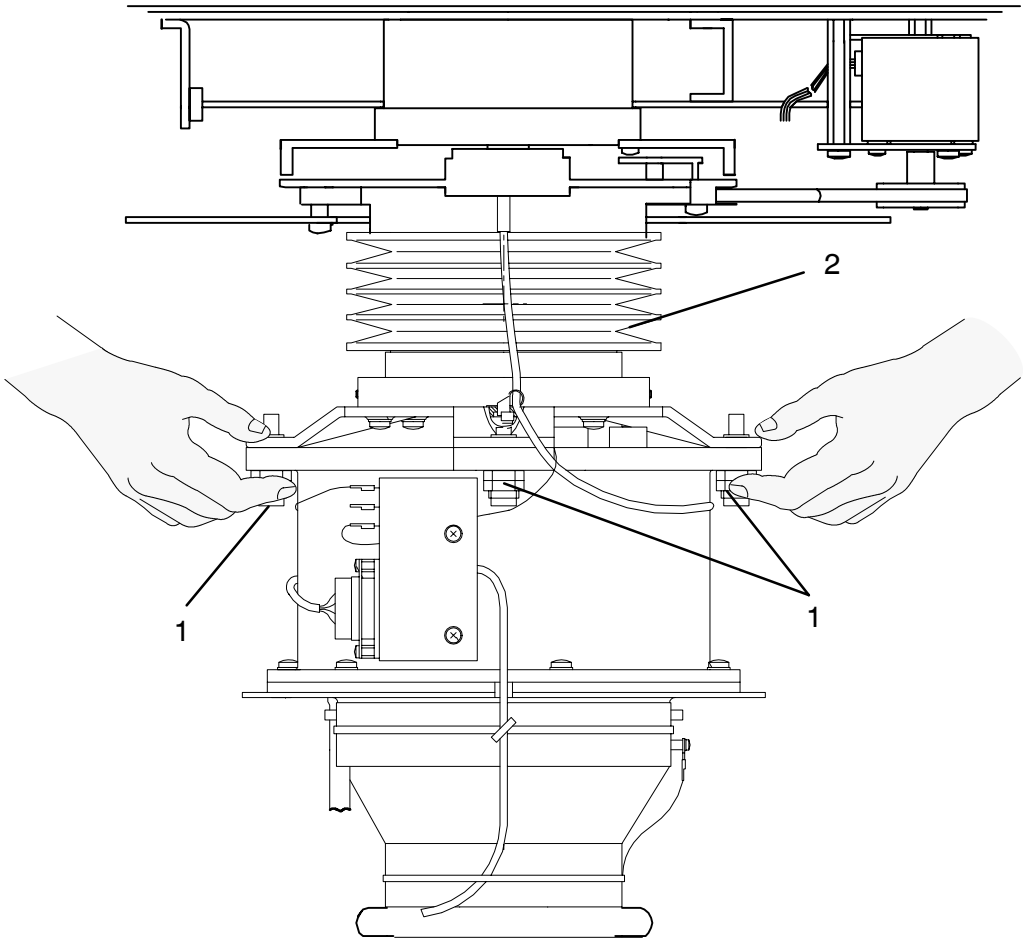


Figure 12: Principle of inserting the outer sphere in the compass enclosure

- Using the thumbs, press down and engage two snap closures (Figure 12/1).
- Turn the outer sphere through 90° and repeat the process with the two other snap closures. The outer sphere is now fastened to the pendulum joint

- Guide the cable around the outer sphere and attach the plugs to the small PCB of the outer sphere, tighten the fastening screws

2.5 Creating cable connections and plug connections

2.5.1 Overview of plug connections and fuses on PCB‘s

(see also section 4 for more information about LED‘s, plugs, push buttons and jumper)

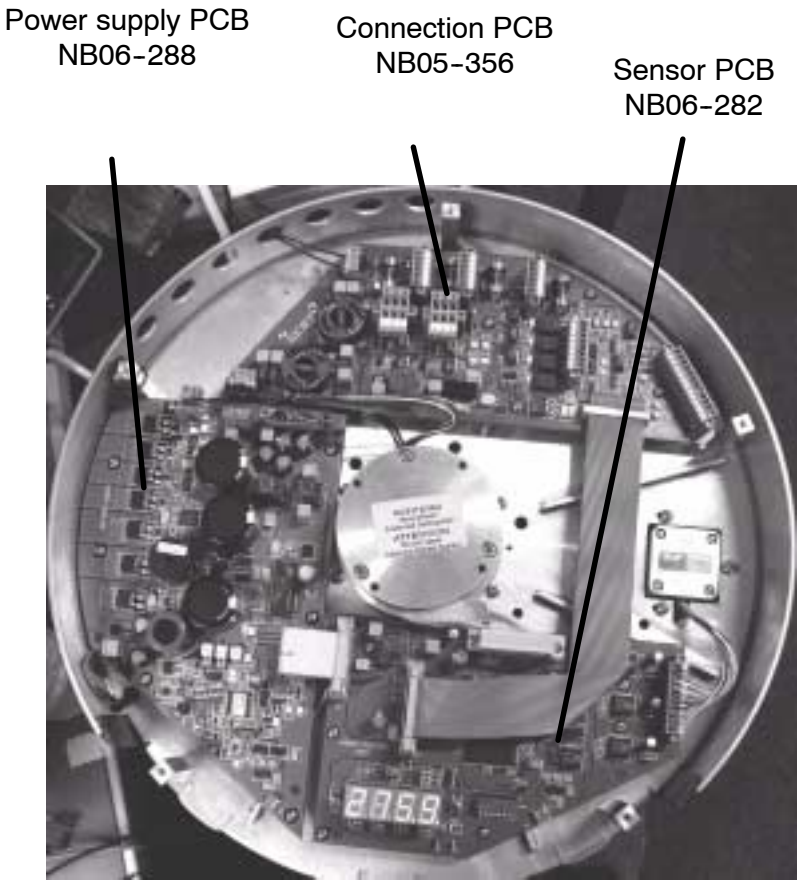


Figure 13: Arrangement of PCB‘s in the STD 22 Compact Compass (cover removed)

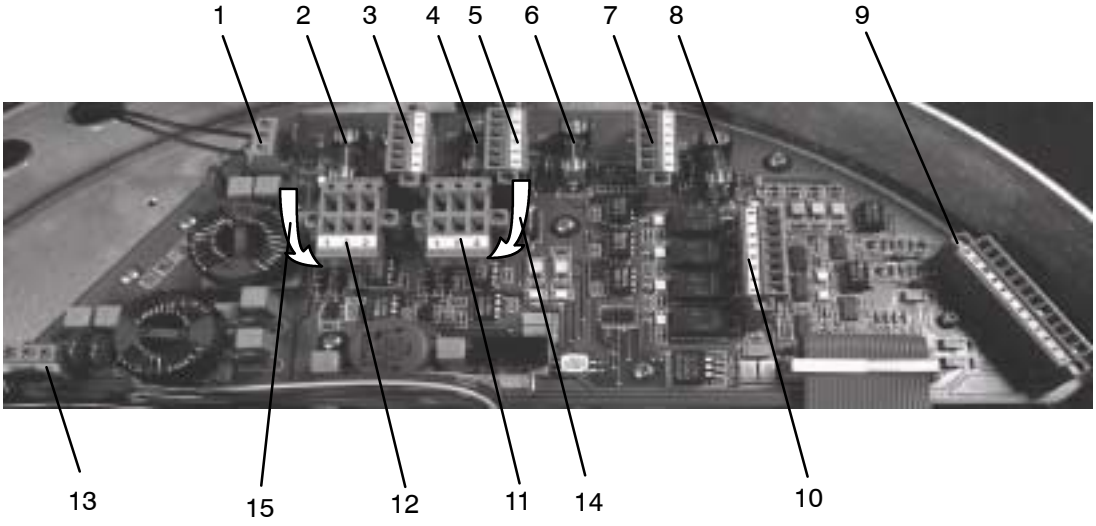


Figure 14: Arrangement of plugs, terminal boards and fuses on the Connection PCB.

(below mentioned plugs and jumper only refer to compass STD22 Compact)

1	Terminal L1	– Power supply (24VDC)
2	Fuse E1 (T10A)	– Power supply (24VDC)
3	Plug B2	– Output Channel1 Course Bus/NMEA
4	Fuse E2 (T1A)	– Channel1 +24V
5	Plug B3	– Output Channel2 Course Bus/NMEA
6	Fuse E3 (T1A)	– Channel2 +24V
7	Plug B4	– Output Course Bus
8	Fuse E4 (T1A)	– Course Bus +24V
9	Plug B5	– Input (+24V/Set QS/ Pulse Log/ Pulse Log Dir./NMEA Log/GPS)
10	Plug B6	– Output (QS/SEC/System/Available)
11	Plug B7	– CAN1 bus
12	Plus B8	– CAN2 bus
13	Terminal Board L2	– 24V connection to Power PCB
14	Jumper B31 (for the CAN2 bus terminating resistor)	
15	Jumper B32 (for the CAN1 bus terminating resistor)	

2.5.1.1 Connecting the course receiver in the STD 22 Compact Gyro Compass

(see also Cable and Connection Diagram 110-233.HP010)

Three outputs are provided on the Connection PCB of the gyro compass for course data:

Output 1 (also Channel 1) for NMEA or Course bus
Output 2 (also Channel 2) for NMEA or Course bus
Output 3 for Course bus only

The setting of output data for Output 1 and Output 2 is described in section 2.6.4.6

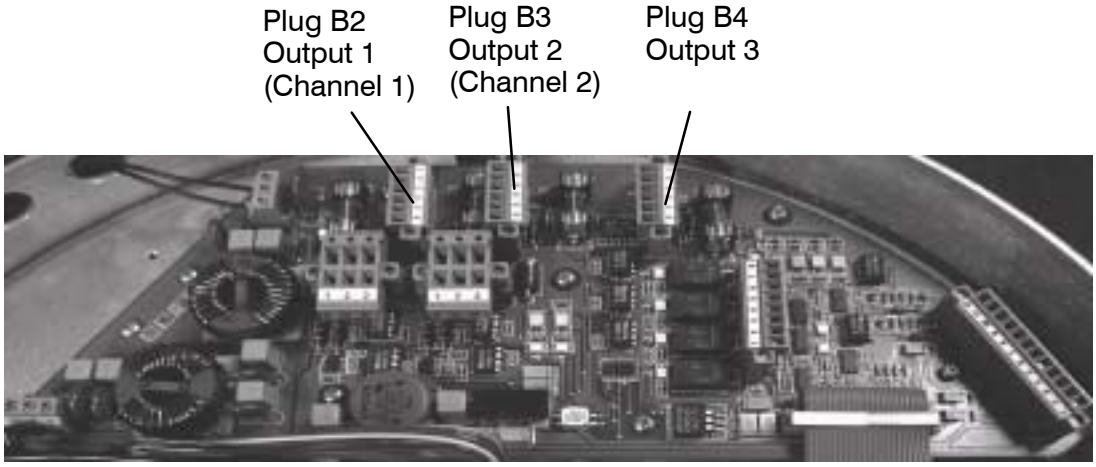


Figure 15: Course receiver connections

Course receivers should be connected with a screened cable having up to 6 poles (appr. 0.5mm2 per conductor).

Output 1 (Channel 1)	Plug B2	Connection 3 Connection 4 Connection 5 Connection 1 Connection 2 Connection 6	TX+ Tx- Tx GND 24VDC 0V ⏚
Output 2 (Channel 2)	Plug B3	Connection 3 Connection 4 Connection 5 Connection 1 Connection 2 Connection 6	TX+ Tx- Tx GND 24VDC 0V ⏚
Output 3	Plug B4	Connection 3 Connection 4 Connection 5 Connection 1 Connection 2 Connection 6	TX+ Tx- Tx GND 24VDC 0V ⏚

2.5.1.2 Connecting status and control signal outputs in the STD 22 Compact Gyro Compass

The following status signals and signals for external signalling can tapped from the Connection PCB of the Gyro compass.

AVAILABLE	(Figure 16/1) (compass data available)
SYSTEM	(Figure 16/2) (general alarm, system error)
QS	(Figure 16/3) (Qick Settling status information)
SEC	(Figure 16/4) (Speed Error Correction status information)

A LED is assigned to each of these connections on the Connection PCB.

AVAILABLE	LED lights up green when the gyro compass is ready for use (Appr. 3 hours after the power supply is switched on)
SYSTEM	LED lights up red if a fault occurs in the gyro compass
QS	LED flashes green if Quick Settling is possible. LED lights up green during Quick Settling. Led goes off when Quick Settling is completed.
SEC	LED goes off if Speed Error Correction is faulty or is impossible because LOG/GPS information is unavailable LED lights up green if Speed Error Correction is OK.

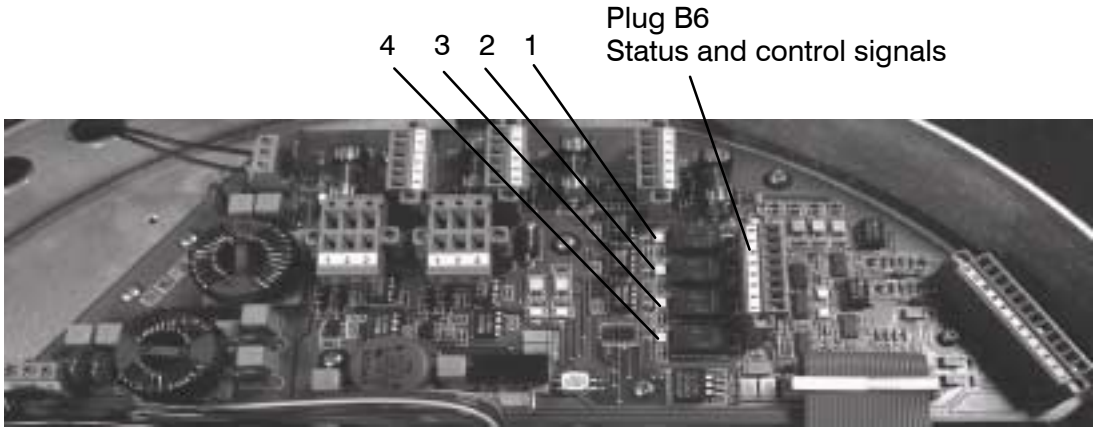


Figure 16: Connection for status and control signals

AVAILABLE	Plug B6	Connection 7 Connection 8	
SYSTEM	Plug B6	Connection 5 Connection 6	
QS	Plug B6	Connection 1 Connection 2	see also section 2.6.3.1
SEC	Plug B6	Connection 3 Connection 4	

2.5.1.3 Connecting signal inputs for QS and SEC in the STD 22 Compact gyro compass

Signal inputs for enabling the Quick Settling function and LOG/GPS information for Speed Error Correction (SEC) ca be connected on the Connection PCB.

The following inputs are available:

SET QS INPUT	for enabling the QS function (via the Quick Settling operator unit)
PULSLOG INPUT	for entering speed information from Puls log for the SEC
PULSLOG DIR.INPUT	for entering the direction (forwards/reverse) of the speed information from a pulse log for SEC
GPS INPUT	for entering position information and where appropriate the speed input from GPS receiver for the SEC
NMEA LOG INPUT	for entering speed information from a log with NMEA format for the SEC

To operate the Speed Error Correction it is necessary to connect a log or a GPS receiver.

Setting the source of the speed sensor for Speed Error Correction is explained in section 2.6.4.7 .

The connecting cable cross section should not be less than 0.5mm^2
(see also drawings: Cable and Connection Diagram 110-233.HP009 and HP010).

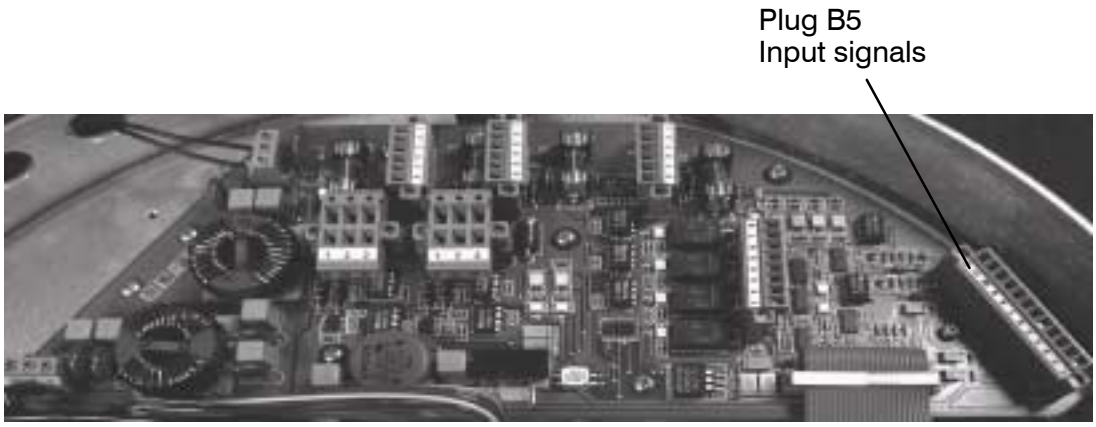


Figure 17: Connection of signal inputs for QS and SEC

SET QS INPUT see also section 2.6.3.1	Plug B5	Terminal 2 Terminal 3	
PULSLOG INPUT	Plug B5	Terminal 4 Terminal 5	
PULSLOG DIR. INPUT	Plug B5	Terminal 6 Terminal 7	
GPS INPUT	Plug B5	Terminal 12 Terminal 11	Rx+ Rx-
NMEA LOG INPUT	Plug B5	Terminal 10 Terminal 9	Rx+ Rx-

2.5.1.4 Connecting the power supply cable

The STD 22 Compact Compass operates at 24VDC.
This voltage can be generated directly using an AC/DC converter (see section 2.6.2) or fed directly from the 24VDC ship‘s mains to the compass.

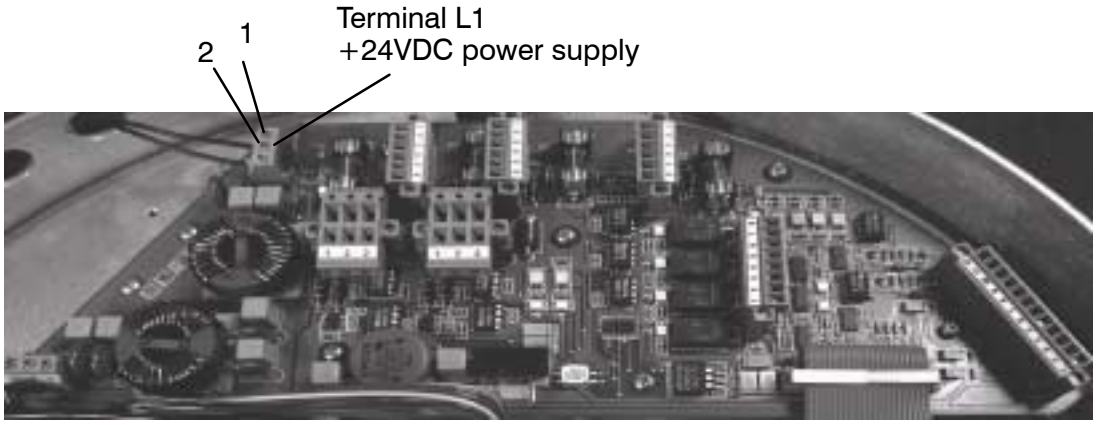


Figure 18: Connection of the +24VDC power supply

The 3-core cable that is used should have a conductor cross-section of ≥2.5mm^2

At terminal L1 (see Figure 18) connect a power supply of
with +24VDC at terminal 1
0V at terminal 2

2.5.1.5 Connecting the compass to earth

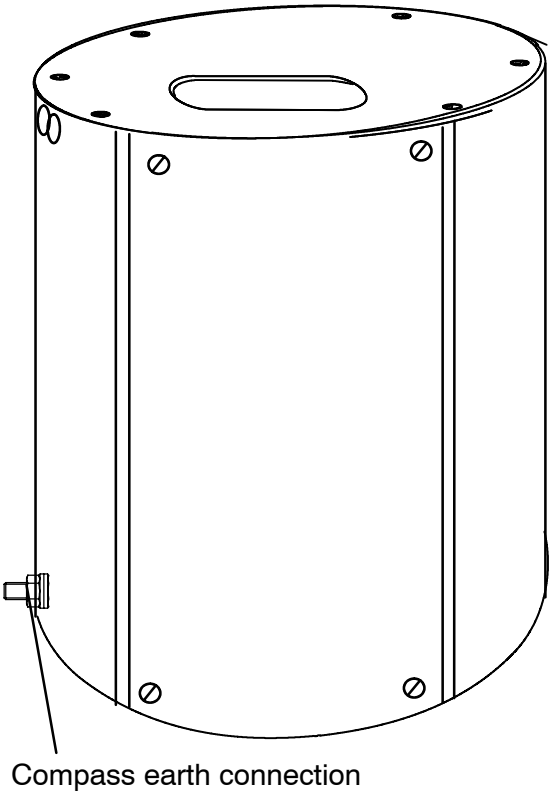


Figure 19: Connection of compass to earth

An earth connection (ship‘s earth) must be made using the earthing shown in Figure 19. The earth connection must have a common reference to the other components!

2.6 Installation and commissioning of optional features

2.6.1 Installation and commissioning of the Additional Output Box 143-103

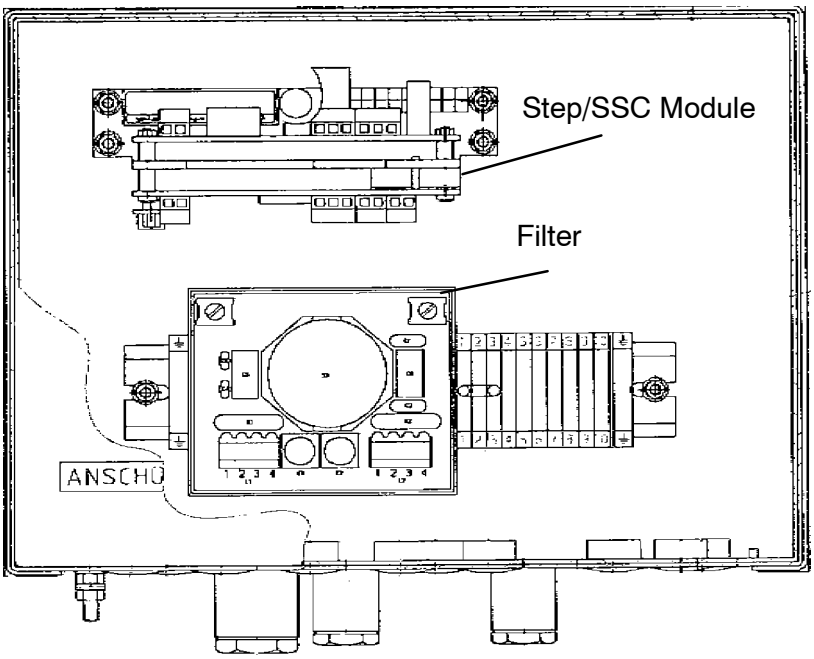


Figure 20: Additional Output Box 146-103 (device open)

Install the Additional Output Box as shown in dimensional drawing 146-103HP005. Ensure that it is proper connected to the ship‘s earth.

Connecting the power supply:

24VDC at terminal L1, terminals 3 (+) und 4(-) of the mains filter.
The power supply can be taken directly from the ship‘s supply (24VDC) or from terminals 6, 7, 8 or 9 (+) und 11, 12, 13 or 14 (-) of the AC/DC-Converters (if supplied) (see also section 2.6.2).

Making a signal connection:
(see also Cable and Connection Diagram 110-233.HP010
and wiring diagram 146-103.HP007)

A 2-core, screened cable with conductor cross-section ≧1mm² is used to create a connection between:

Plug B4 on Connection PCB of the STD 22 Compact Gyro Compass
Terminal 3 (TX+) und 4 (TX-)
and
terminal board L4, terminals 1 (Rx-) und 2 (RX+) of the Step/SSC Modules in the Additional Output Box (siehe Figure 20).

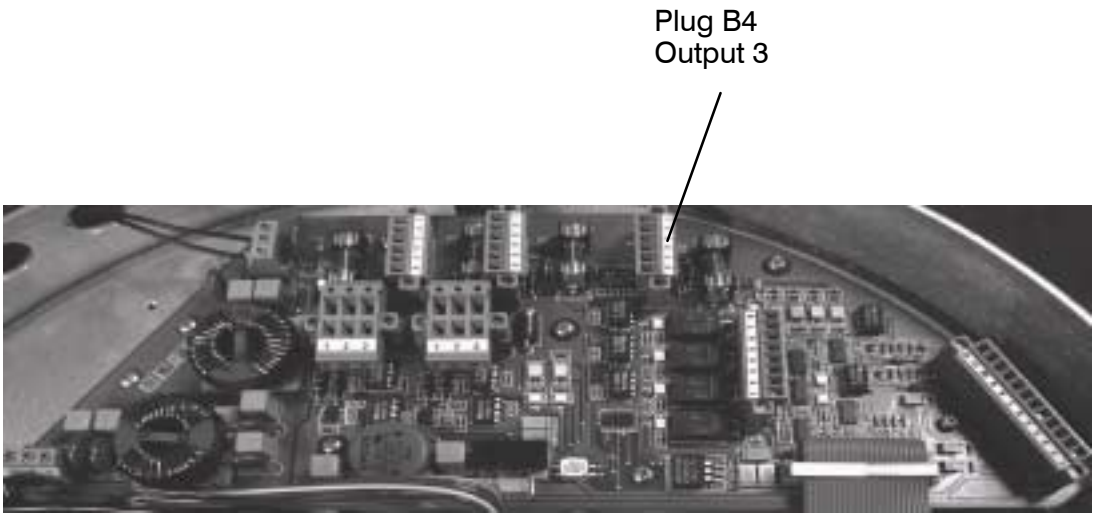


Figure 21: Connection of Course Bus in the STD 22 Compact Gyro Compass

The signal outputs from the Additional Output Box are created as shown in the drawings
- Cable and Connection Diagram 110-233.HP010
and
- Wiring diagram 146-103.HP007.

2.6.2 Installation and commissioning of the AC/DC Converters 121-062

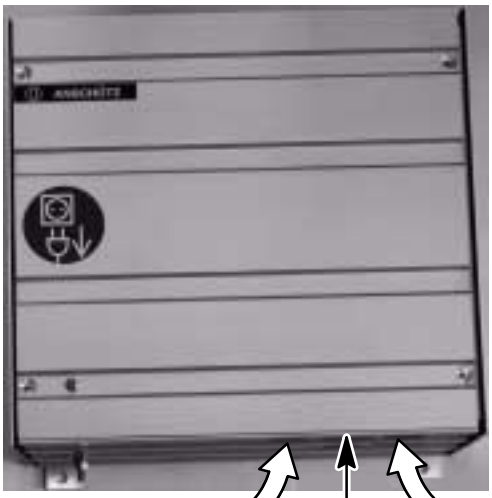


Figure 22: AC/DC Converter

NOTE: Detailed dimensions can be found in drawing 121 D 062.HP005.
For connecting the AC/DC Converter, see also Cable and Connection Diagram STD 22 Compact 11-233.HP010.
and connection diagram on the cover.

Fasten the AC/DC Converter on a firm surface with 4 screws.

Caution:
Before connecting the cable, the AC/DC Converter must be disconnected from the power supply and safeguarded against reconnecting until it is set into operation.

Take care to ensure that a common earth is used for all components of the STD 22or STD 22 Compact Gyro Compass.

To connect the AC/DC Converter to the ship‘s mains, use a cable which meets following minimum requirements:

2 x 1,5mm^2 (with screen, single-side connected to the housing)

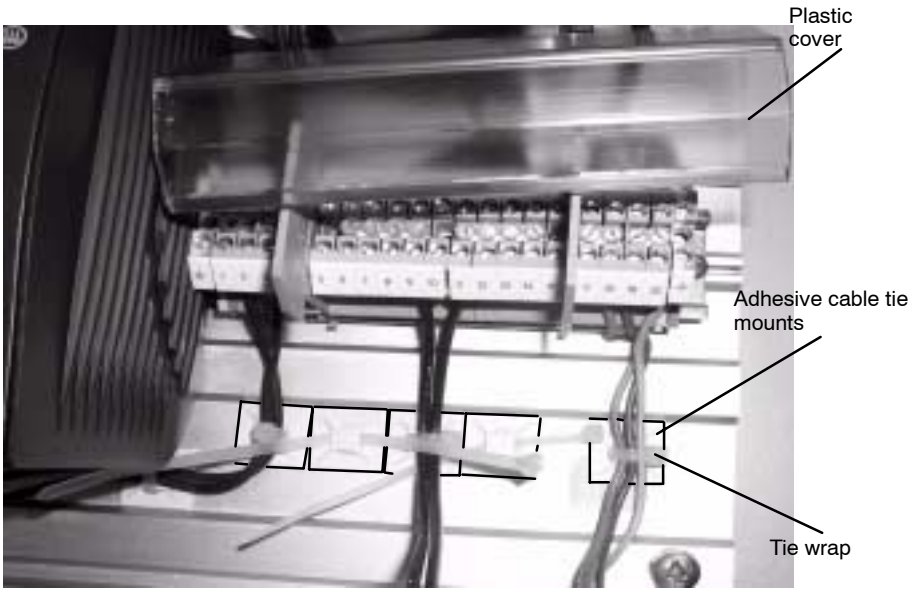


Figure 23: AC/DC Converter (Terminal board)

To connect the cables to the terminal board, the plastic cover has to be pulled off from the terminal board.
Cables should not be lengthened too long, to prevent a short circuit to a neighbour terminal by an inadvertently loosening.
Additionally the cable should be fixed (as shown in Figure 23) with tie wraps and self adhesive tie mounts.
After that the plastic cover has to be pulled on the terminal board.

The ship‘s electrical supply (AC_{IN} = 85... 264V, 50/60Hz) must be connected to the terminal board at terminals **17** and **19** or **18** und **20** see Figure 23.

To connect the AC/DC Converter with a 24VDC load, use cables which meet the following minimum requirements:

- 2 x 2,5mm^2 (with screen) gyro compass
- 2 x 0,5mm^2 (with screen) Additional Output Box

The output voltage (24VDC supply) is taken from the terminals:
6(24VDC) and **11**(0V) or
7(24VDC) and **12**(0V) or
8(24VDC) and **13**(0V) or
9(24VDC) and **14**(0V) .

Before connecting the 24VDC load to the AC/DC Converter, the output voltage must be measured. It must be within the tolerance range of 18 VDC to 36 VDC.
After the ship‘s mains is switched on, the AC/DC Converter is supplied at 24VDC.
The AC/DC Converter does not need to be switched on separately.

2.6.3 Installation and commissioning of the Operator Unit Quick Settling (QS) 130-606

Figure 24: Operator Unit Quick-Settling (front view)

2.6.3.1 Installing the Operator Unit Quick-Settling

NOTE: Detailed dimensions can be found in drawing 130 E 606.HP005.
For connecting the Operator Unit Quick Settling, see also Cable and Connection diagram STD 22 Compact 110-233.HP010.

The Operator Unit Quick Settling is designed for desk mounting.

When installing ensure there is sufficient clearance underneath the operator unit (minimum 32mm, see drilling scheme)
The Operator Unit Quick Settling can be fixed in a panel up to 17 mm thick.

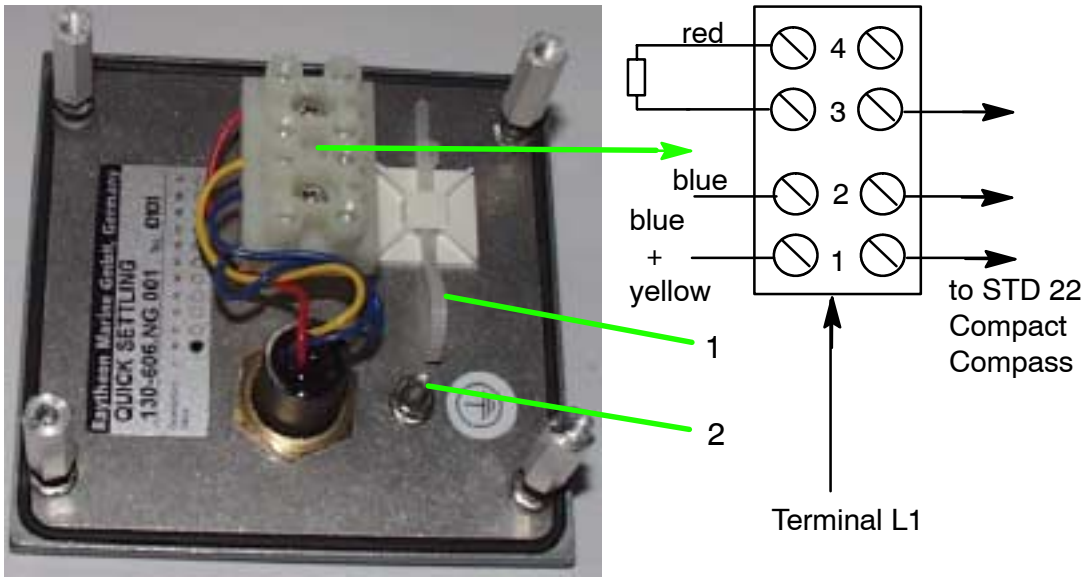


Figure 25: Operator Unit Quick Settling (rear view)

The Operator Unit Quick Settling should be connected to the compass by a cable which meets the following minimum requirements (see also Figure 26).

- 4 x 0,5^{2}mm with screen
- 1 x 0,5^{2}mm (for jumper to be installed)

The screening of the cable is connected to earth in the Operator Unit Quick Settling (Figure 25/2).
The cable is fastened with the strain relief (cable grip) (Figure 25/1) in the Operator Unit Quick-Settling.

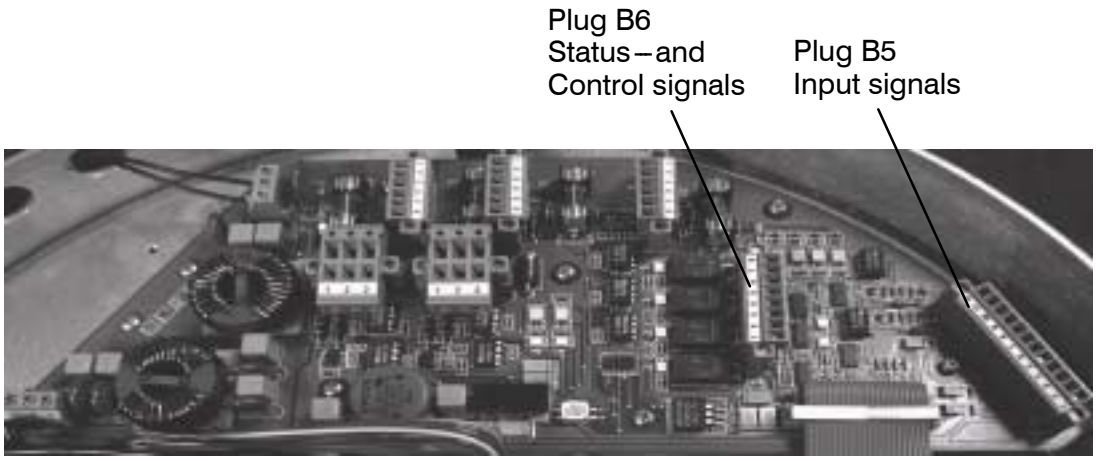


Figure 26: Connecting the Operator Unit Quick Settling in the STD22 Compact Gyro Compass

Operator Unit Quick-Settling	STD 22 Compact Gyro Compass
Terminal L1, connection 1	Plug B5, connection 3
Terminal L1, connection 2	Plug B5, connection 2
Terminal L1, connection 3	Plug B6, connection 2
STD 22 Compact Gyro Compass: jumper from plug B6, Pin 1 to plug B5, Pin 1 (24VDC)	

2.6.4 Switching on, settling and adjustment

2.6.4.1 Switching on the compass

The compass unit switches on when the power supply is activated on the main control panel.

2.6.4.2 Checks on the compass

Measuring the compass power supply voltage (on the compass).
This voltage must fall within the tolerance range (15 VDC to 36 VDC).

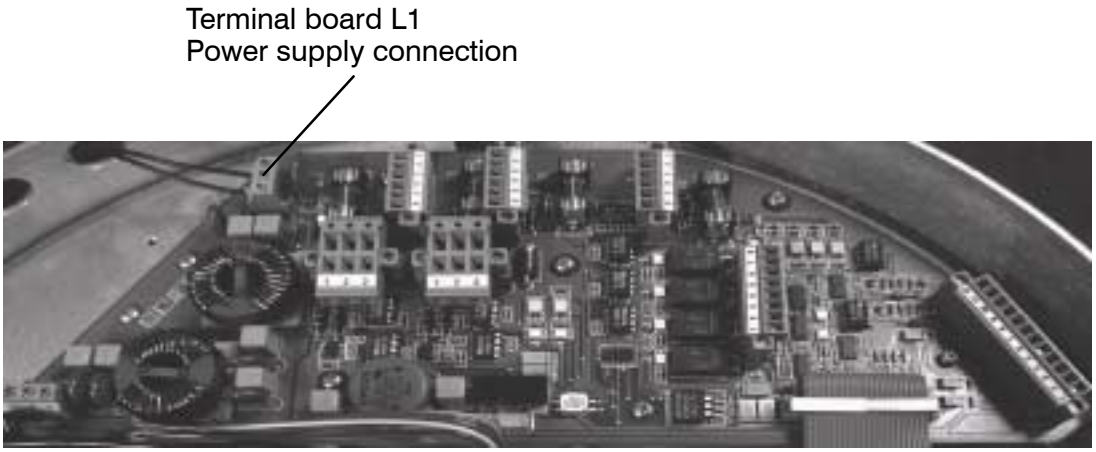


Figure 27: Measuring the compass power supply voltage

Terminal board L1 terminal 1 +24VDC
Terminal board L1 terminal 2 0V

NOTE: The absolute lower limit for the power supply voltage is 12VDC, the absolute upper limit is 40VDC!
When connecting cables, ensure that these values are adhered to.

Checking the DIP switch settings on the compass (see Figure 28):

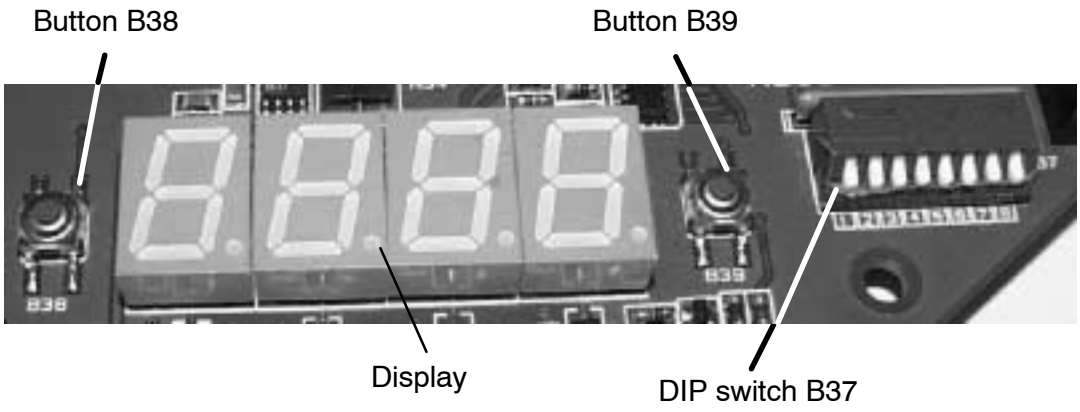
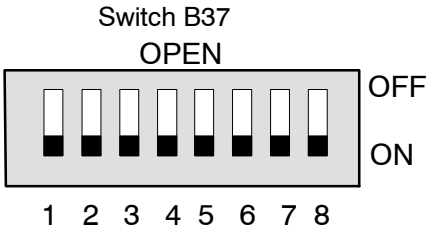


Figure 28: Checks on the compass before setting into operation

All DIP switches in the “ON” position.



2.6.4.3 Setting the STD 22 Compact Compass into operation

The compass goes into heating stage for the first 30 minutes (this period will vary depending on the temperature of the supporting liquid), during which time the course output of the compass should not be used, and the letter “h” is displayed as the leading sign on the digital display (see Figure 29).

During the settling in stage (for 3 hours after switching on), the course output of the compass may be used; **however, the deviation from the actual course may still be considerable (as well as it is at all connected course receivers).**
During this period, an additional dit appears in the digital display of the compass (see Figure 30).

(The “Quick Settling” option reduces the settling in stage to appr. 1 hour).

After 3 hours from switching on, the compass course may be used.
Approximately 3 hours after switching on, the compass has a accuracy of <2 °.

After appr. 5 hours (after switching on), the compass has an accuracy of von 0,1° x $^{1}/_{cos}$ latitude.

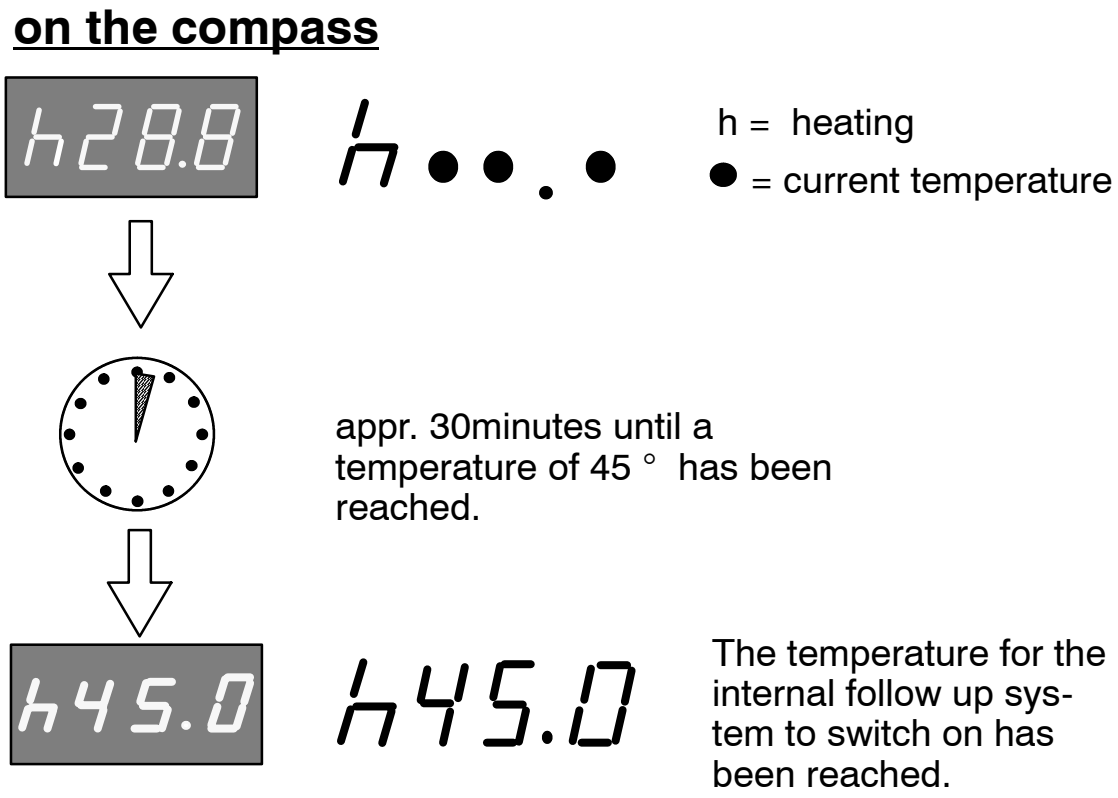

on the compass
h28.8
h • • . •
h = heating
• = current temperature
appr. 30minutes until a temperature of 45 ° has been reached.
h45.0
h45.0
The temperature for the internal follow up system to switch on has been reached.

Figure 29: Indications on the compass during the heating stage

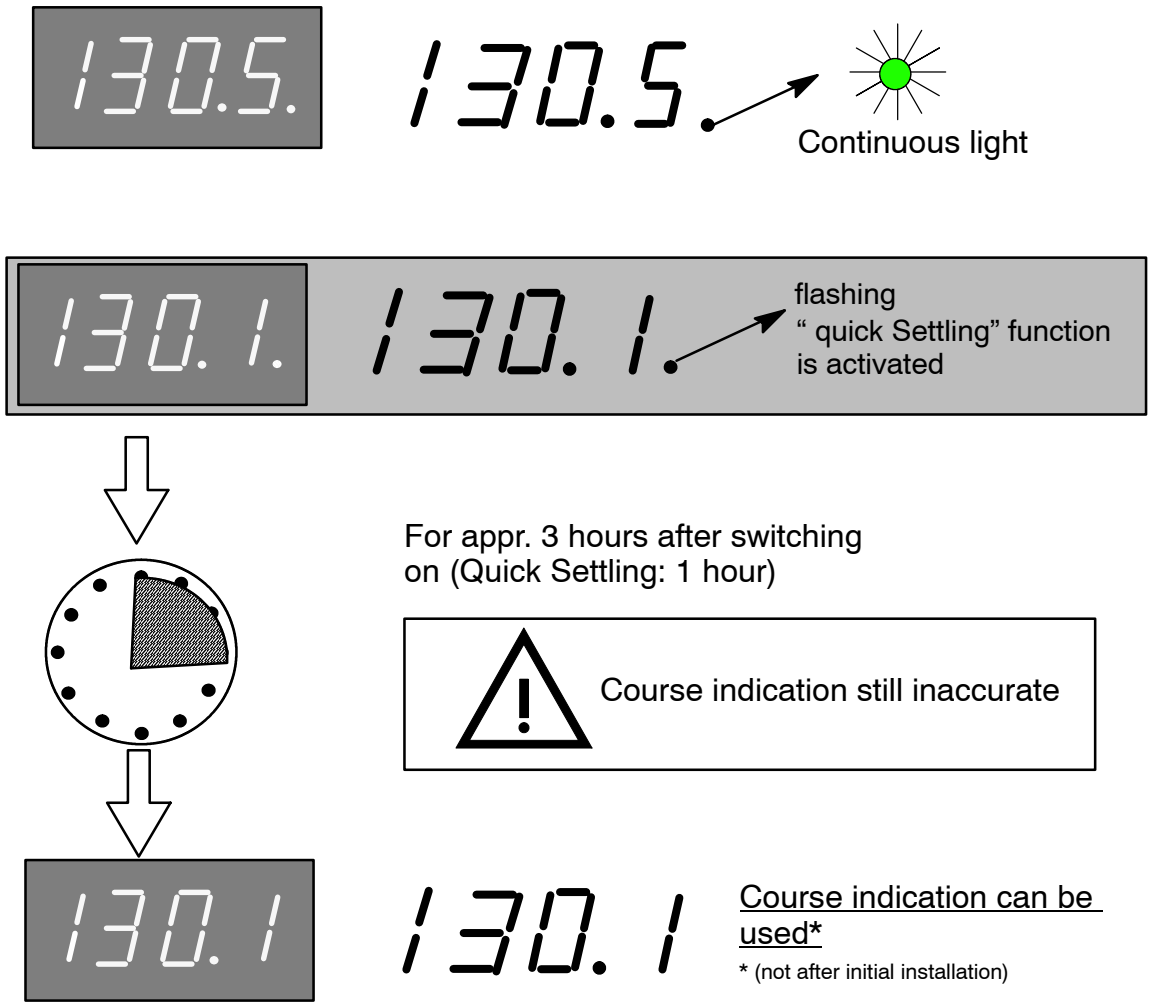


Figure 30: Indications on the compass during the settling stage

2.6.4.4 Setting the compass zero (reference course)

Once the compass has been installed, it must be aligned according to its installation location. The compass zero is set using DIP switch B 37 and buttons B 38 and B 39.

The compass must have been in operation for at least 5 hours before the compass zero is set.

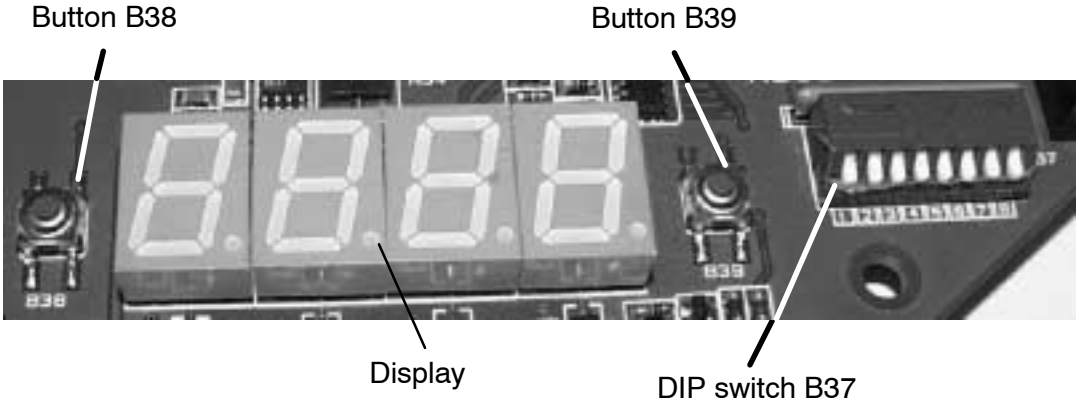


Figure 31: DIP switch B37 and buttons B38/B39

The reference course to be set is determined from the ship's fore-and-aft line (e.g. take a bearing or obtain the pier course from the sea chart).
This reference course is entered according to the following procedure.

- Set DIP switch B37 "1" to the "OFF" position.
  The digital indicator is now indicating "ALEr" = Alignment Error
- Press button B38 or button B39 until the heading you require is displayed (B38 changes the value downwards and B39 changes it upwards).
- If you hold down the button the speed at which it changes will increase.
  Set DIP switch B37 "1" to the "ON" position. This saves the set value in the compass.
- After the reference course has been set, read the alignment error (see next section).

(See also Figure 32)

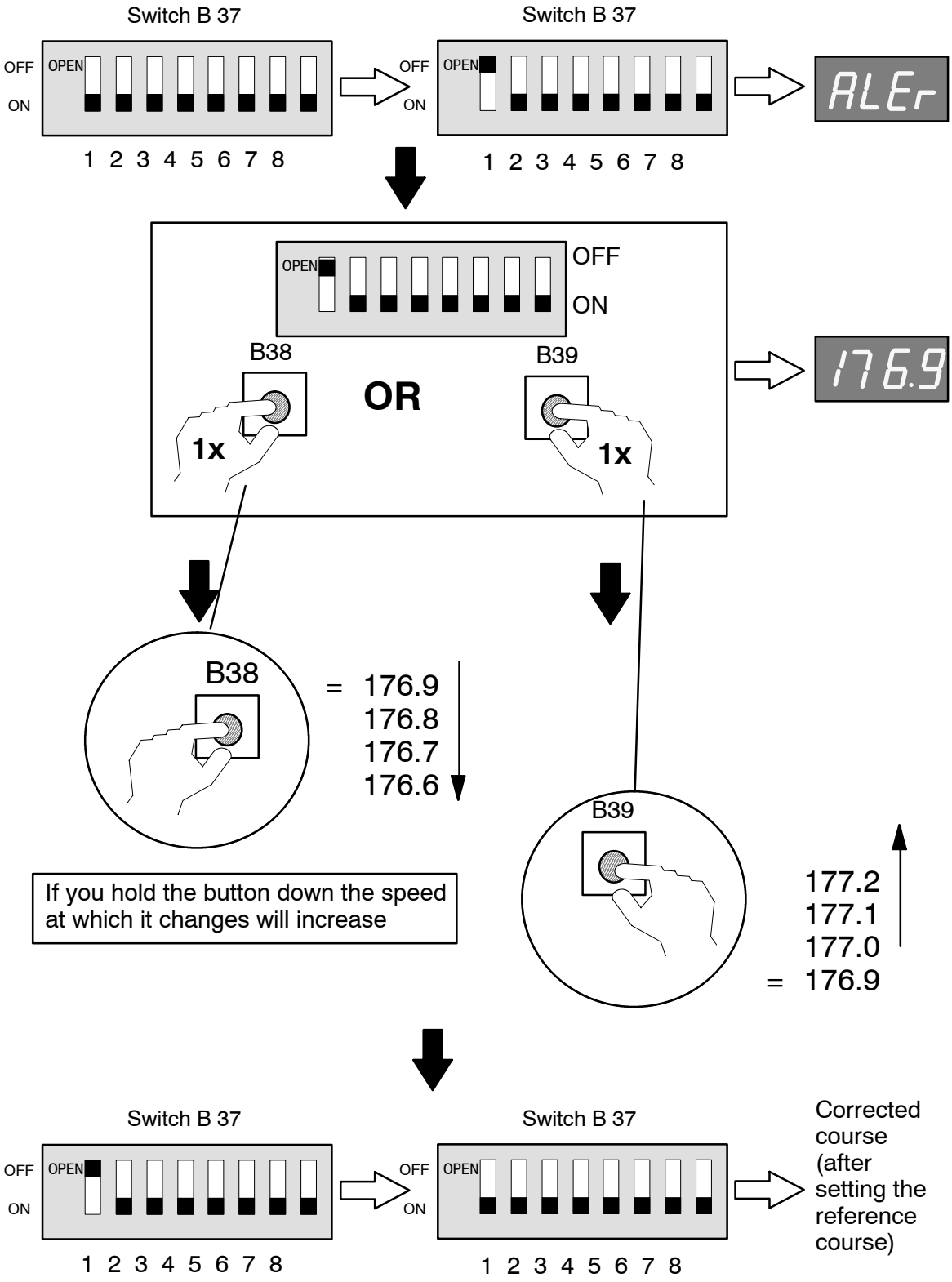


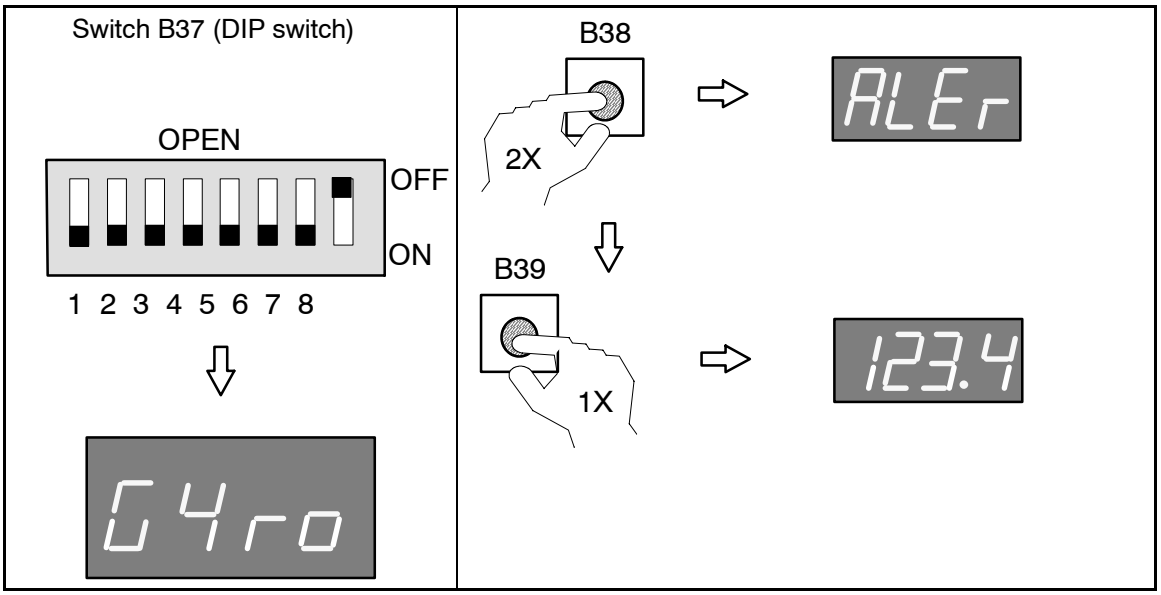
Figure 32: Procedure for setting the compass zero

2.6.4.5 Reading the alignment error

The alignment error must be entered in the table provided for that purpose on the inside of the cover.

Alignment Error	
123.4	

Figure 33: Table at compass cover (inner side)



DIP-switch “8” in “OFF” position.

NOTE: It is essential to enter this value, because the alignment error will be needed if the sensor electronics are replaced, in order to determine the reference course for the new PCB.

DIP switch “8” in “ON” position.

The STD 22 Compass is ready for use.

Replace the cover of the compass and screw it tight.

2.6.4.6 Setting Channel 1 and Channel 2

Unscrew and remove the cover of the compass housing.

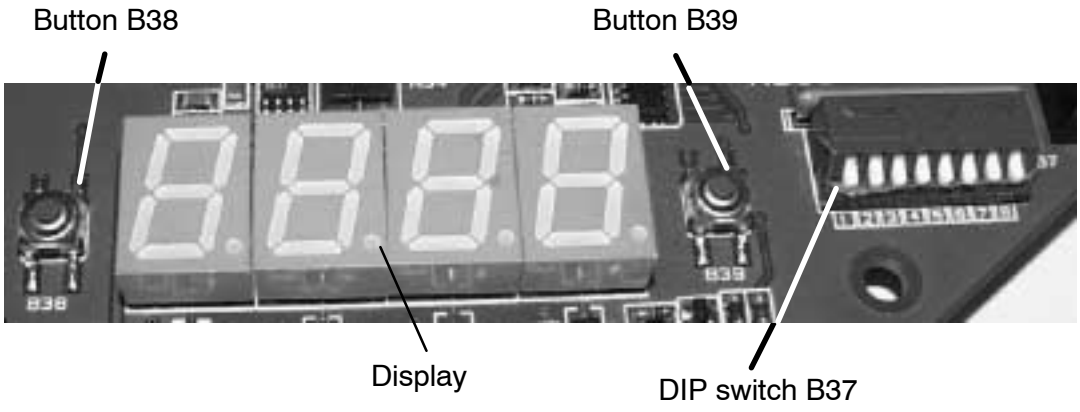
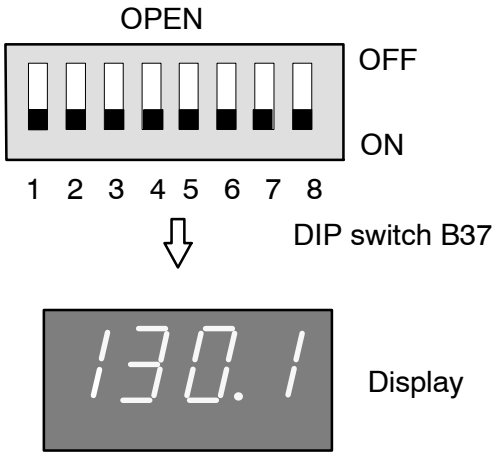
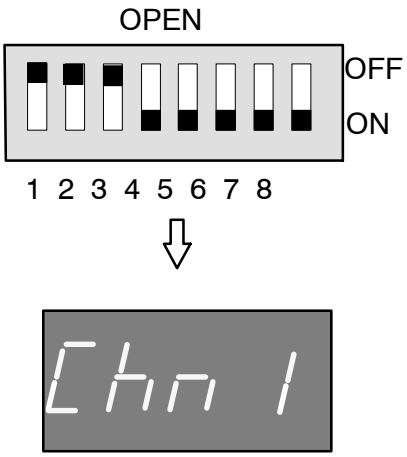
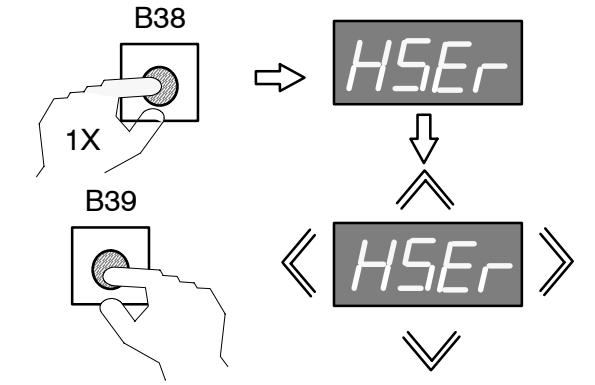
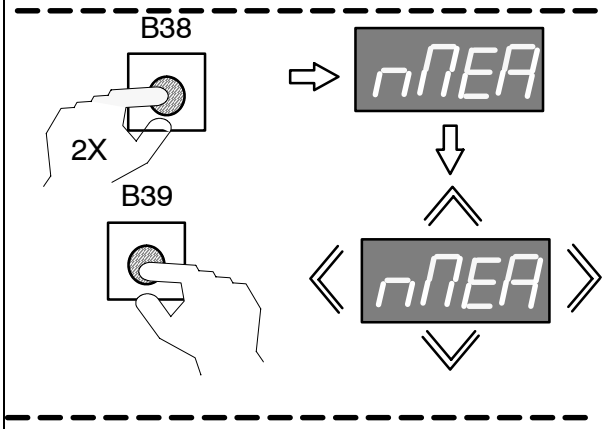
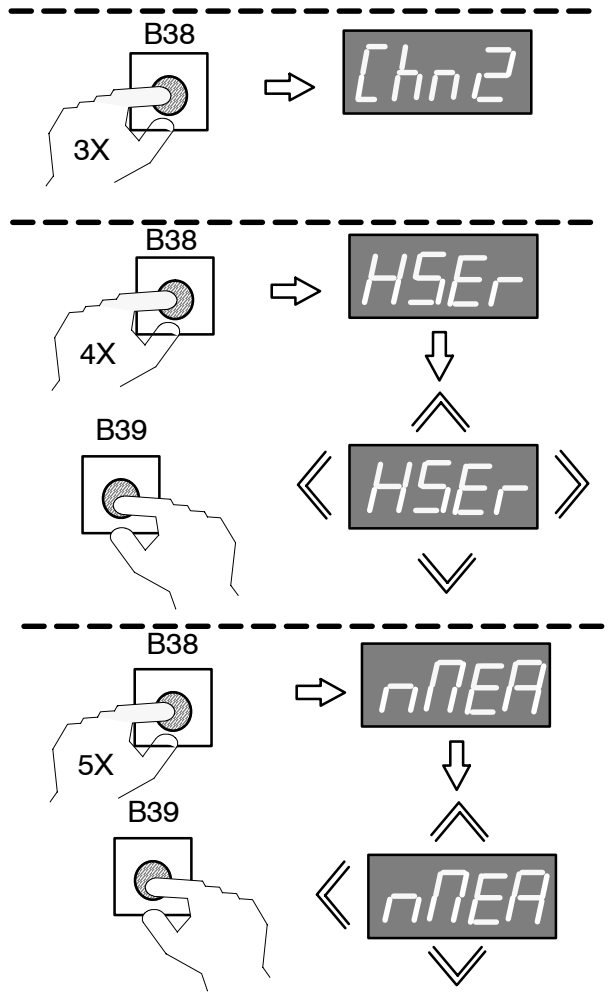


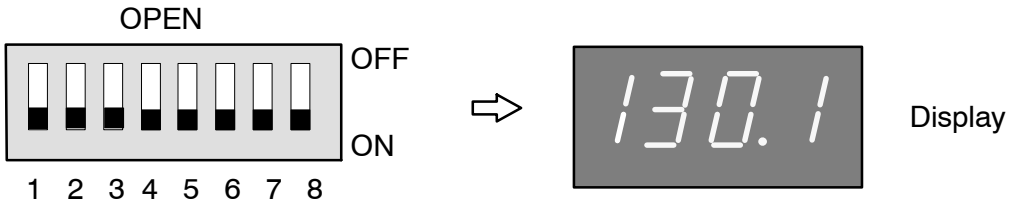
Figure 34: DIP switch B37 and buttons B38/B39

Initial status:



Indications	Comments, Information
Setting the interface for Channel 1 and Channel 2. HSEr = Heading serial (Course Bus) nMEA = NMEA 0183 The “flashing” setting is accepted.	
Switch B37 (DIP switch)  	  Continued on next page

Indications	Comments, Information
	



2.6.4.7 Setting the information source for Speed Error Correction

Unscrew and remove the cover of the compass housing.

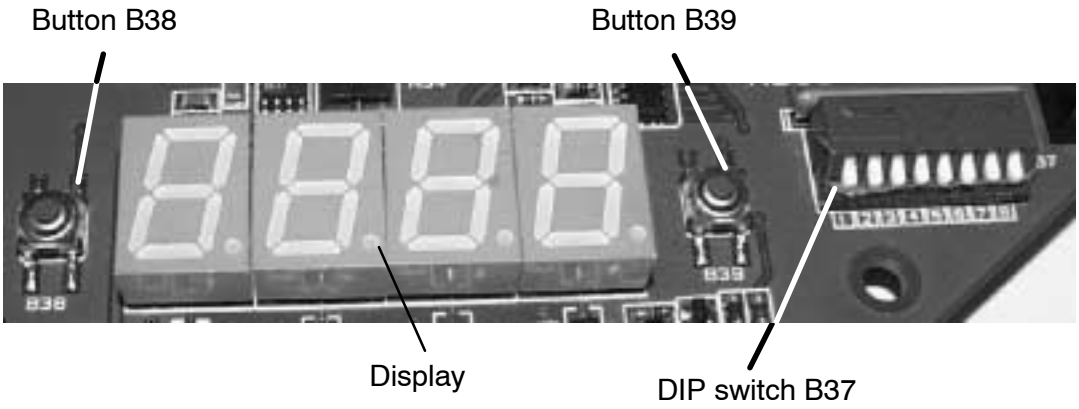
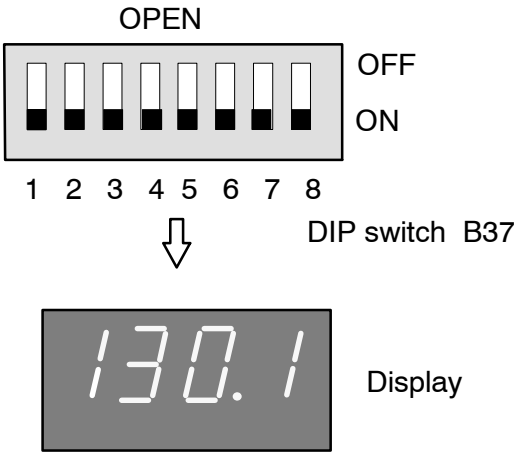


Figure 35: DIP switch B37 and buttons B38/B39

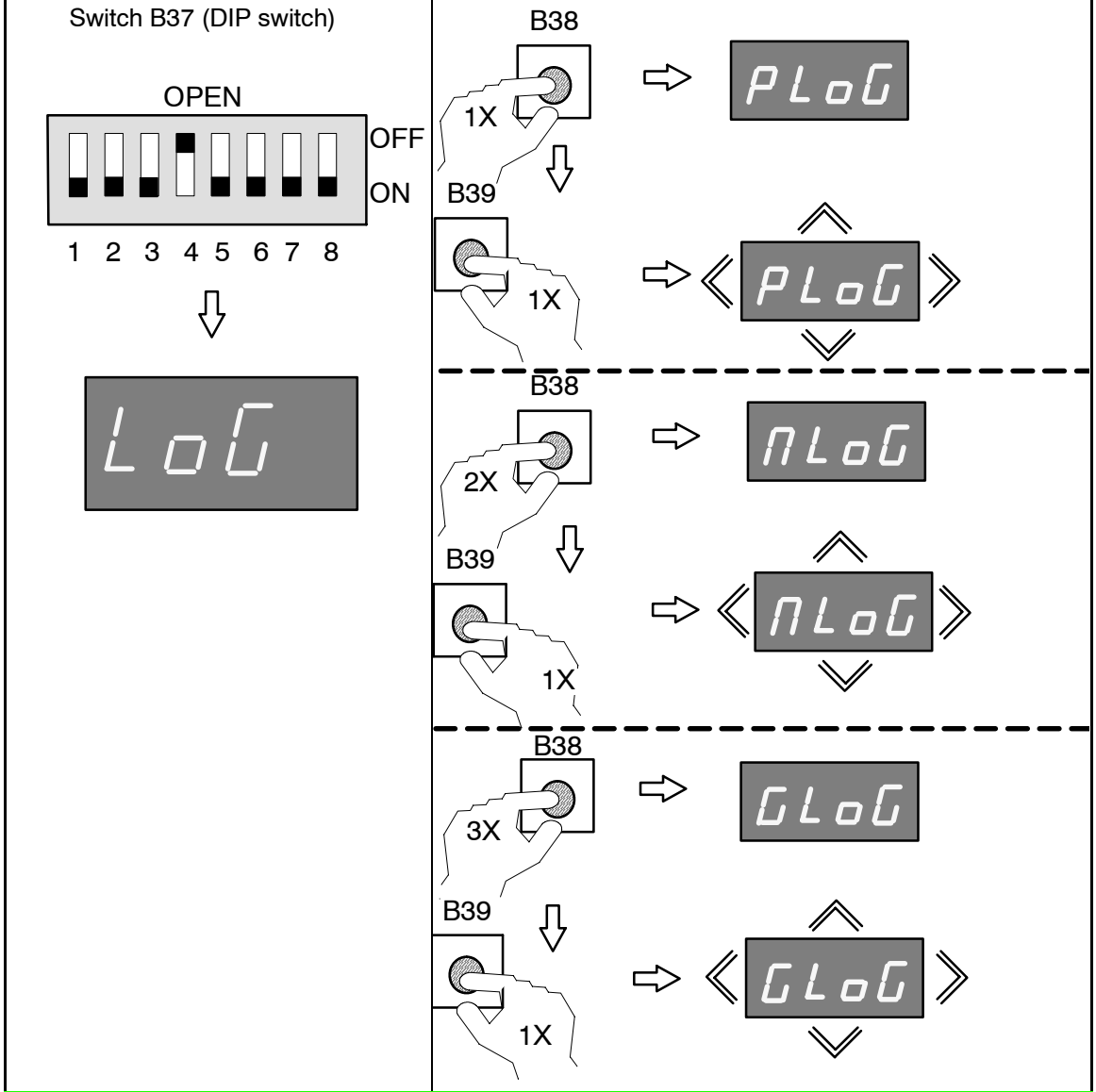
Initial status:

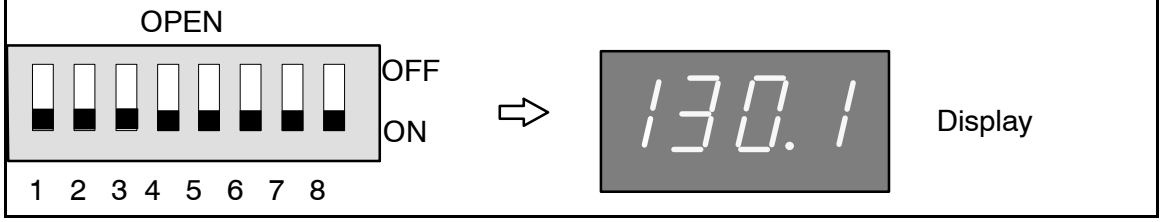


Indications	Comments, Information

PLoG = Puls-Log
NLoG = NMEA-Log
GLoG = GPS-Speed
The indications in the flashing display are selected.

If the setting does not correspond to the connected device, the course correction relay responds and gives an appropriate warning only to devices which are connected to this alarm output.





2.6.4.8 Adjustment of essential operating modes

Unscrew and remove the cover of the compass housing.

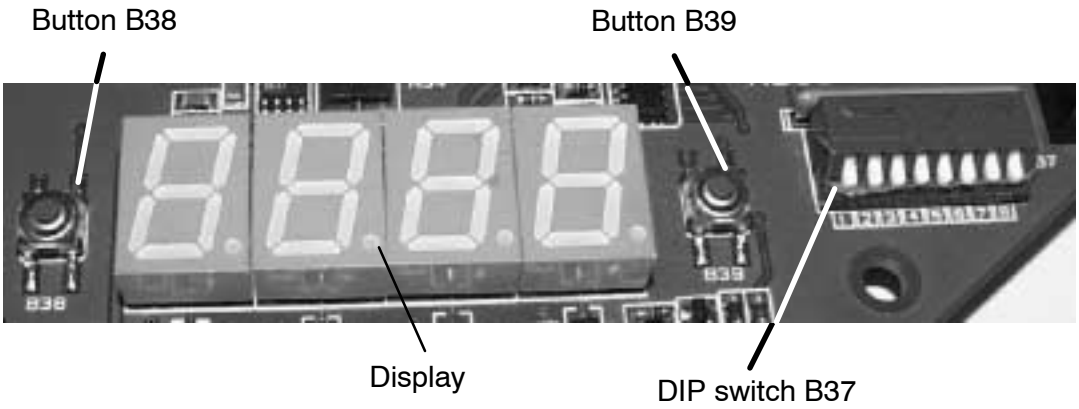
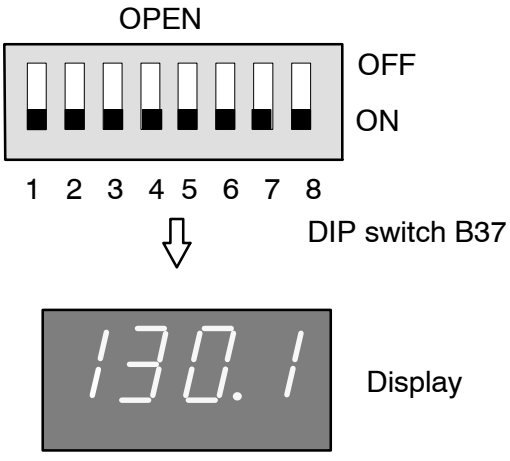
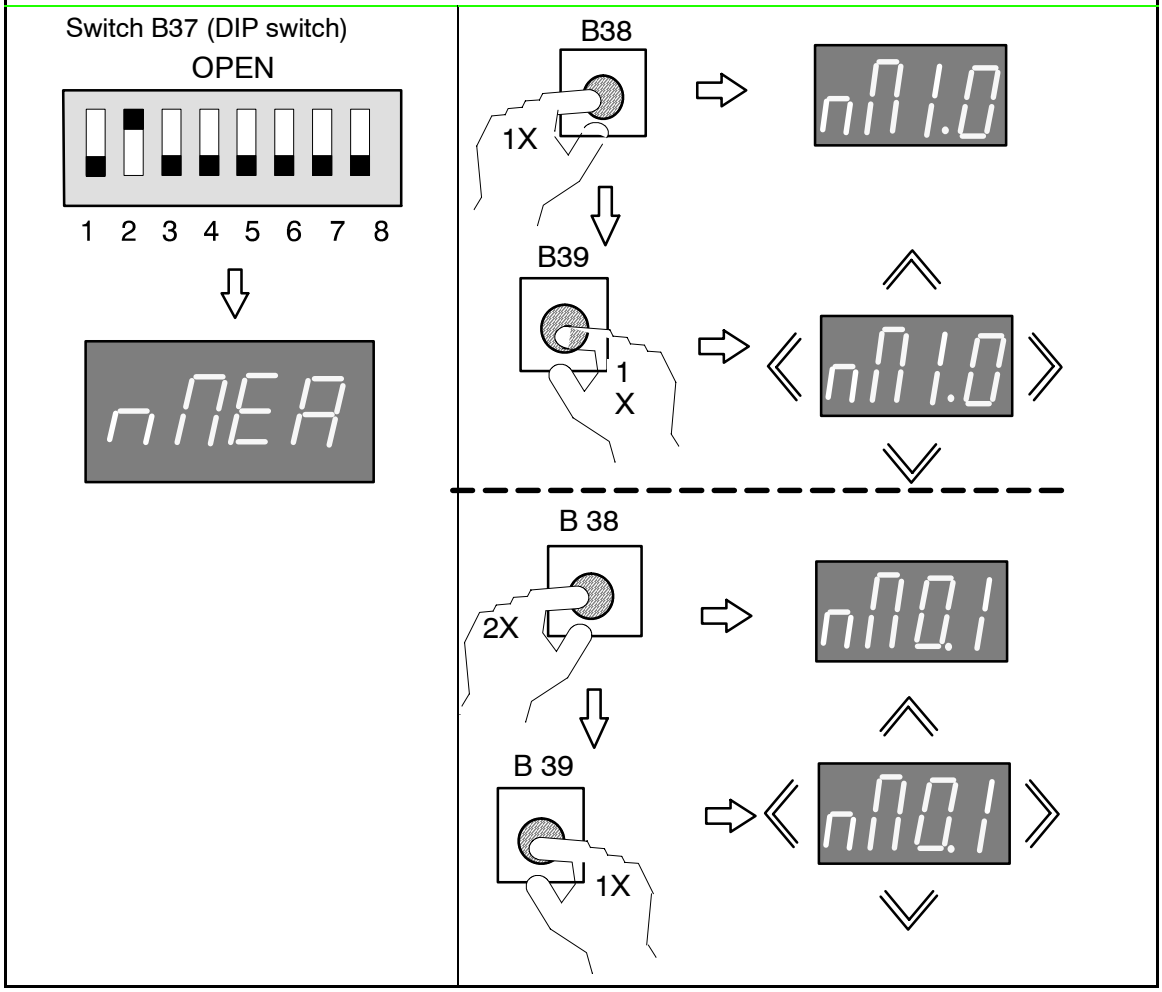


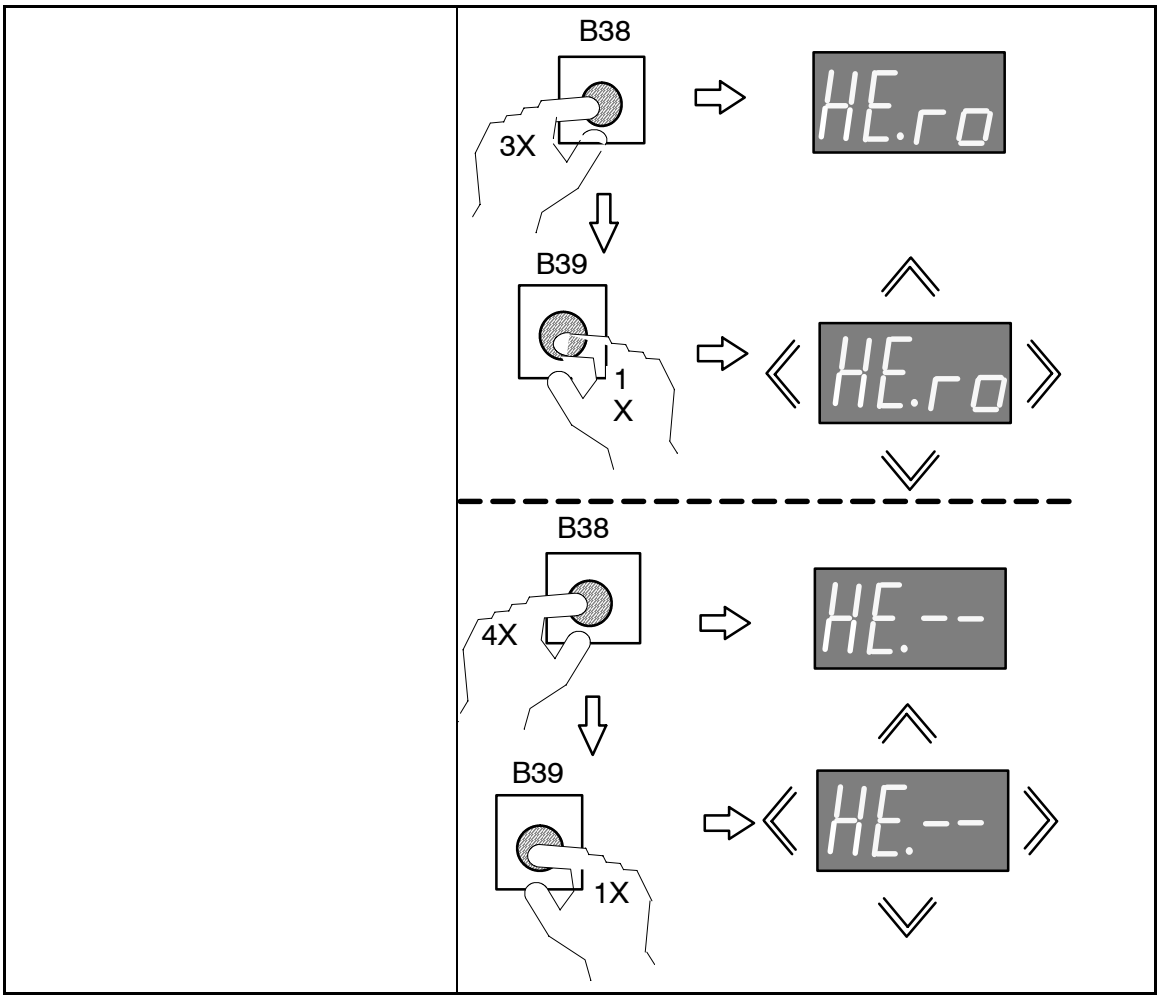
Figure 36: DIP switch B37 and buttons B38/B39

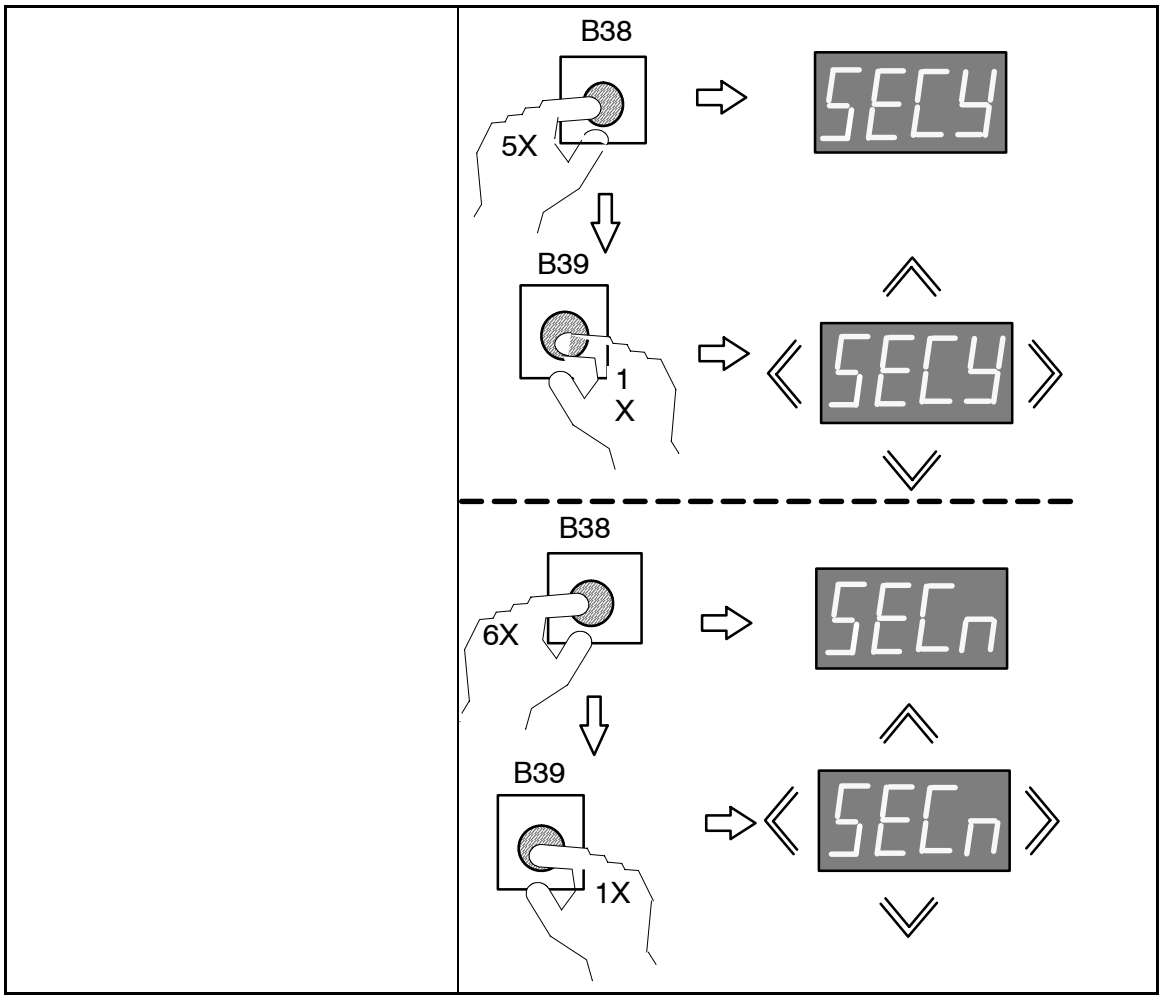
Initial status:



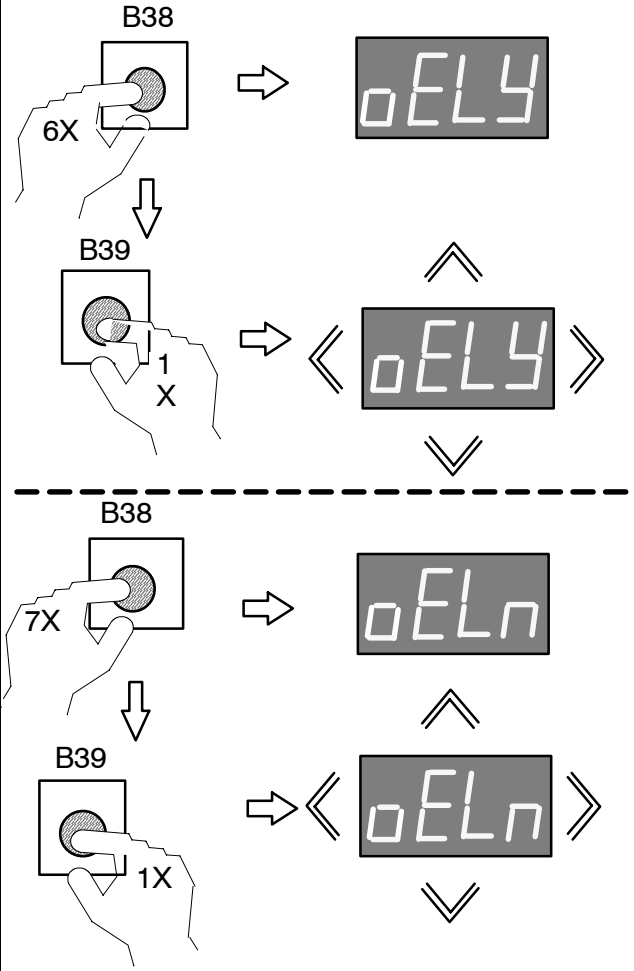
Set the repetition rate of the NMEA heading data output, the output with or without ROT (Rate of Turn), with or without oil residual error for the speed error correction and the setting of a connected Data Distribution Unit **(Data Distribution Unit is not for STD 22 Compact Gyro Compass)**.
1.0 heading data transmission 1 x per second.
0.1 heading data transmission 1 x per second.
HE.ro heading with ROT.
HE.-- heading only
SECY heading data incorporating Speed Error Correction
SECn heading data without Speed Error Correction
oELY Speed Error Correction with oil residual error **(recommended setting → SEC)**
oELn Speed Error Correction without oil residual error
ddUY with connected Data Distribution Unit **(only for STD 22)**
ddUn without Data Distribution Unit **(for STD 22 Compact absolute necessary)**
The indications in the flashing display are selected.

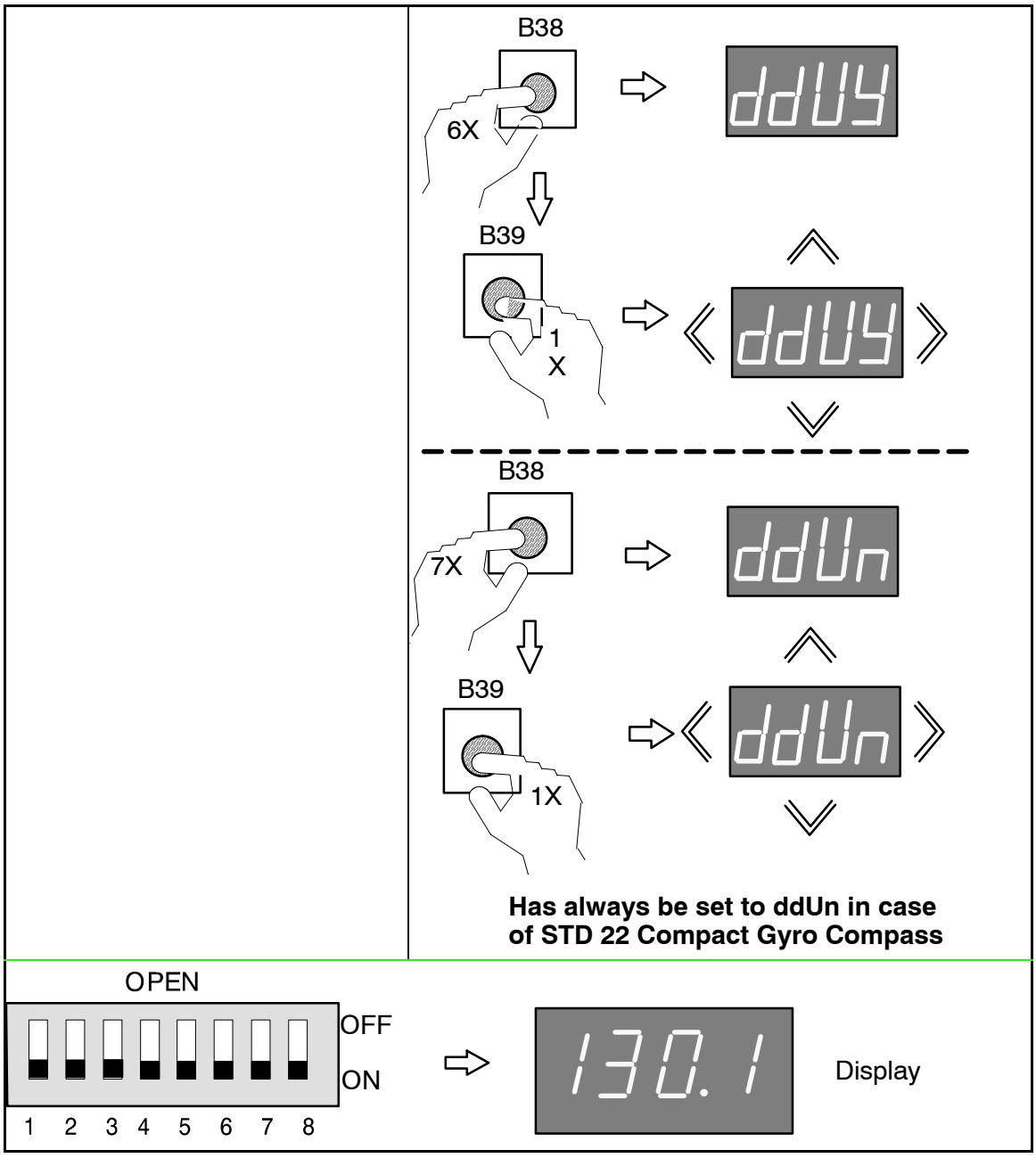



B38
3X
HE.ro
B39
1
X
HE.ro
B38
4X
HE.--
B39
1X
HE.--


B38
5X
SEC4
B39
1
X
SEC4
B38
6X
SECn
B39
1X
SECn

With Speed Error Correction has to be set always to oELY




B38
6X
ddU4
B39
1
X
ddU4
B38
7X
ddUn
B39
1X
ddUn
Has always be set to ddUn in case
of STD 22 Compact Gyro Compass
OPEN
OFF
ON
1 2 3 4 5 6 7 8
130.1
Display

2.6.4.9 Function check on externally connected course receivers

(not implemented at the present time)

Unscrew and remove the cover of the compass housing.

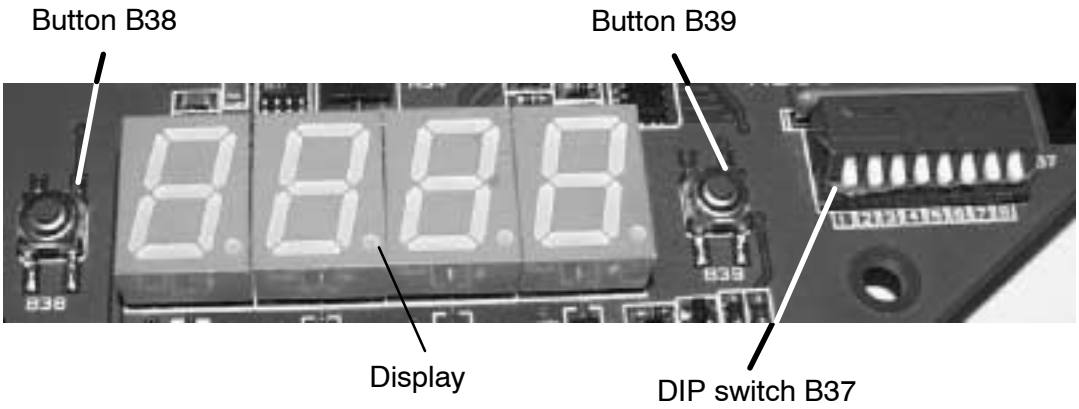
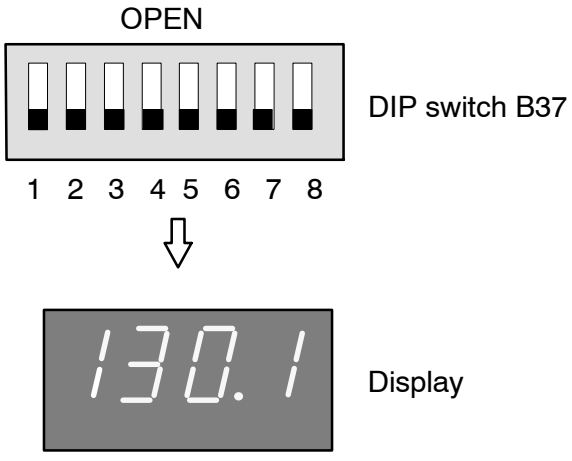
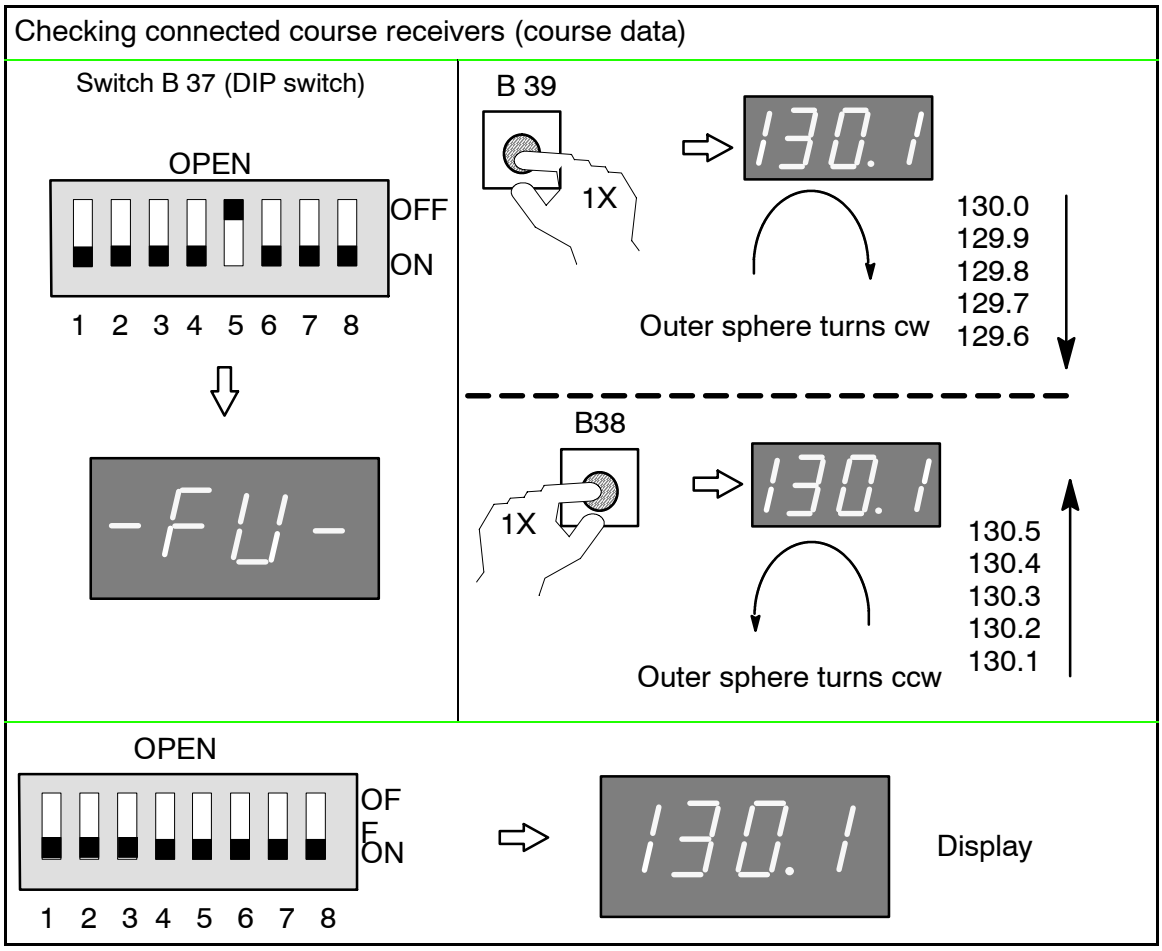


Figure 37: DIP switch B37 and button B38/B39

Initial status:




Checking connected course receivers (course data)
Switch B 37 (DIP switch)
OPEN
OFF
ON
1 2 3 4 5 6 7 8
-FU-
B 39
1X
130.1
Outer sphere turns cw
130.0
129.9
129.8
129.7
129.6
B38
1X
130.1
Outer sphere turns ccw
130.5
130.4
130.3
130.2
130.1
OPEN
OF
F
ON
1 2 3 4 5 6 7 8
130.1
Display

3 Preparing to install the STD 22 Gyro Compass

To ensure that the STD 22 Gyro Compass is installed and put into operation correctly, these instructions must be followed in the order in which they appear.
It must not be installed or put into operation whilst at sea.

3.1 STD 22 Compass – Scope of Supply

The scope of supply consists of:

- Compass (110-233)
  - Outer sphere
  - Distilled water
  - Supporting liquid
  - Gyrosphere (111-006)
- User manual for the STD 22 Compass
- Installation and service manual for the STD 22 Compass
- Tools and spare parts pack
  - Sealing rings
  - Suction cup
  - Filling device
  - Injector

The STD 22 Gyro Compass is used in conjunction with at least the following items of equipment:

- Distribution Unit 138-118 (separate manual)
- Operator Unit 130-613 (separate manual)

3.1.1 General information concerning installation of the STD 22 Compass

When fitting components, observe the following spacing:

Fit the compass enclosure so that the display can be viewed from above and the cover of the enclosure can be removed (see also Dimensional Drawing 110-133.HP005).

To ensure fault-free operation of the STD 22 Compass, it is essential to follow these directions, safety notes and installation instructions.

Instructions relating to cable cross-sections and earth connections must be adhered to.

The tools which are specified for installing the compass must be used.

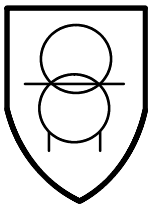
Only original parts or parts approved by the manufacturer may be used in connection with the STD 22 Compass.

See also Cable Connection Diagram 110-233 HP009 for the STD 22 Compass.

Gyro Compass should not be installed in oil-containing ambient air, within surrounding in vibration and should installed on a vibration-free platform.

Gyro compass should be installed on the ships‘ line (vertical and horizontal).

The installation of the power supply (AC/DC-Converter) should only be performed by an experienced electrician.



The supply voltage has to be engineered as a low-security-voltage according to SELV.

The respective label at the power supply has to be observed.

3.2 Creating cable connections

3.2.1 General information concerning on-board wiring

The cables which are to be connected to the STD 22 Gyro Compass are led through one of the cable entries at the top of the compass enclosure and fixed in the cable entry with a cable clip suitable for the size of the cable.
The cable entries are supplied with the compass.

Caution:
Ensure that cables are not live before creating cable connections.
It is vitally important to ensure that all cables are free of voltage; where appropriate, carry out voltage measurements beforehand and/or disconnect the relevant distributor from the power supply.

To ensure that the compass functions correctly, it is essential to adhere to the following sequence when creating cable connections.

- Strip the cable over a length of approximately 180 mm (depending on the distance of the cable entry from the terminal). Be careful not to damage the screening.
- Trim the screening so as to leave approximately 15 mm on the cable.

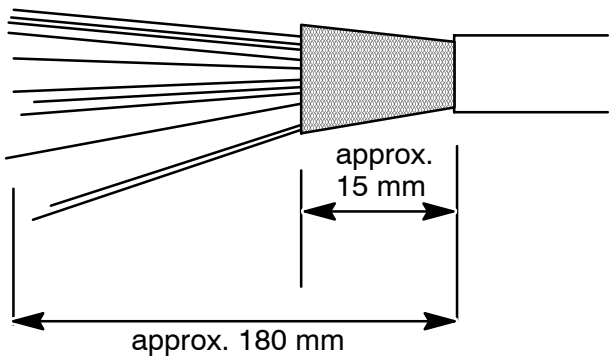


Figure 37: Requirements for stripping the connecting cable

- Push the components of the screw fastening over the cable.
  It is essential to follow the sequence (as shown in Figure 38).
- Check the cone and the mating piece of the earthing insert for corrosion and if necessary remove corrosion with an emery cloth.
- Push the mating piece of the earthing insert to the end of the cable sheath.
- Push the cone inside the screening and against the mating piece. Ensure that the screening is evenly distributed over the cone (see Figure 38).

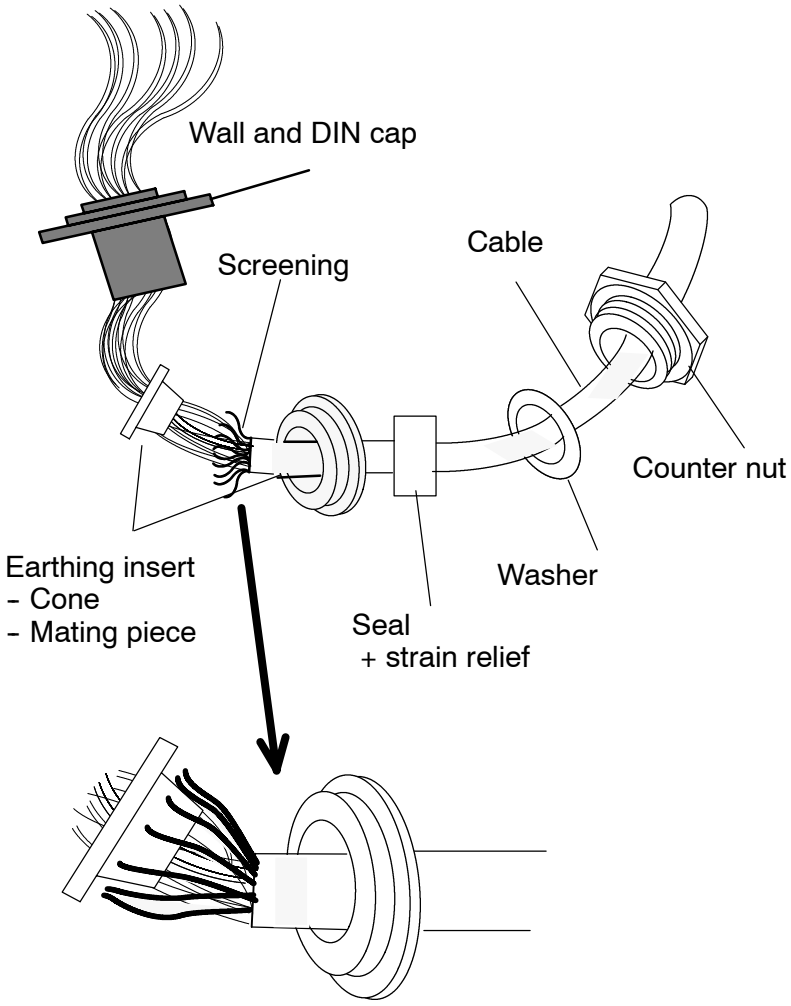


Figure 38: Creating the cable connection

- Place the earthing insert, strain relief and washer in the cable entry; fit and tighten the counter nut.
- Strip the cable conductors to a length of about 1.5 cm, lightly twist them and fit cable end sleeves.
  Tighten the terminal screws – check the connection is secure by pulling gently.

3.2.1.1 General information about creating an earth connection

The following instructions relating to the creation of cable connections must be adhered to in order to comply with the stringent EMC requirements.
The specified cable types must be used.

It is vital to ensure that these connections have **a common** reference to ship's earth.
Additional components (optional features) must likewise be connected to the common earth.

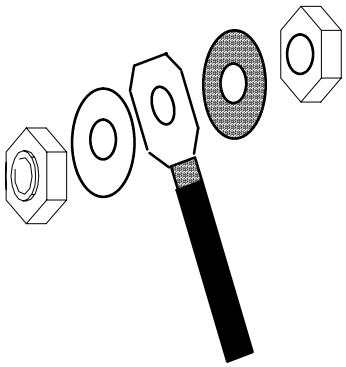


Figure 39: Creating an earth connection

Each earth connection must be made as shown in Figure 39.
The earth cable, to which a cable lug is attached, must have a cross-section of at least 1.5 mm^2.
The cable lug is mounted between a pair of toothed washers.
Earth connections must be free of all corrosion; they must be screwed tight.

3.3 Installing the compass and putting it into operation

3.3.1 Remove the transportation support with outer sphere, supporting liquid and distilled water.

- Undo the 4 screws (Figure 40 /1) at the top and bottom of the enclosure door, lift out the door and detach the earthing strip (Figure 40/2) on the inside of the door.
- Carefully remove the transport packaging with the outer sphere and the two bottles containing supporting liquid and distilled water from the compass enclosure.
- Take the outer sphere out of the transport packaging and place it on the base plate; the outer sphere must be secured to prevent it from tilting

Caution:
Danger of tilting!

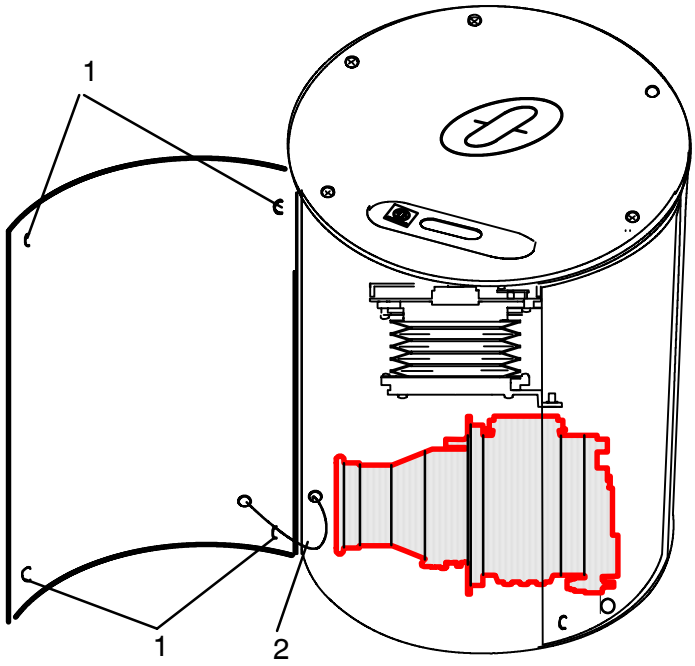


Figure 40: Principle of dismantling the enclosure door

3.3.1.1 Assembling the compass enclosure

Note: It is not necessary to install the compass enclosure with reference to the ship (e.g. in the ship's forward direction). It can be installed in whatever position is most convenient for servicing and operation (compass enclosure removable and it must be possible to open the compass door – observe the size of tools).
The installation described below is to be regarded as the manufacturer's recommendation.

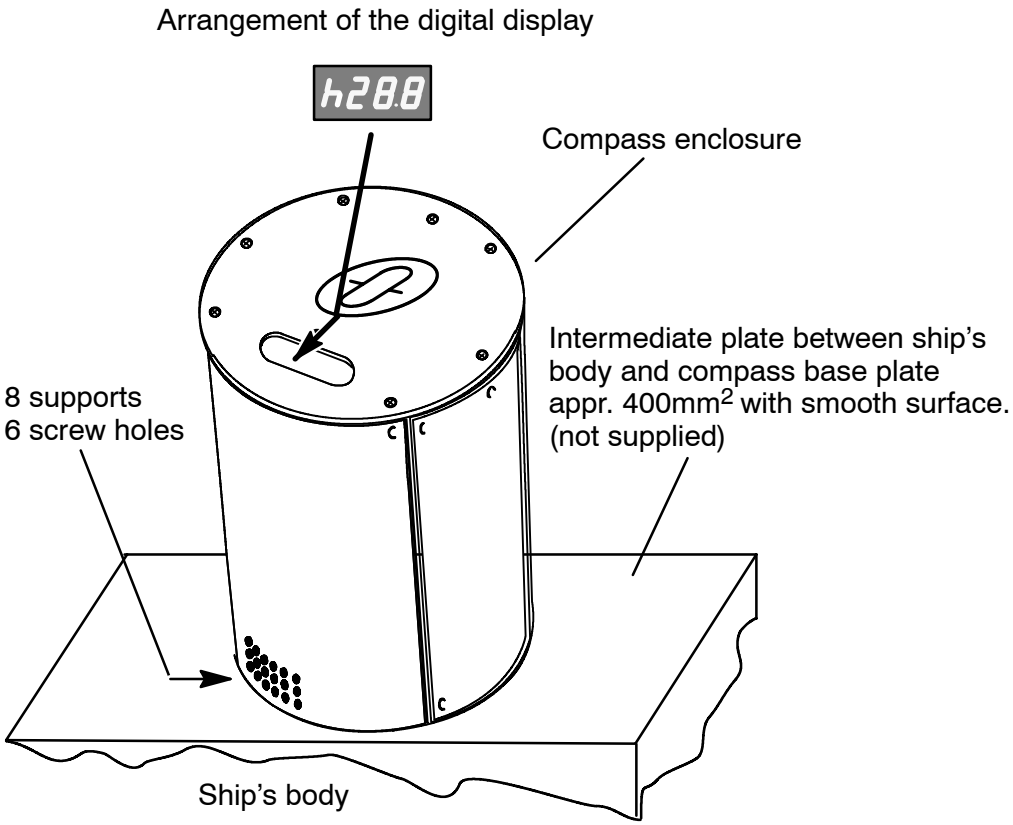

Arrangement of the digital display
h28.8
Compass enclosure
Intermediate plate between ship's body and compass base plate appr. 400mm2 with smooth surface. (not supplied)
8 supports
6 screw holes
Ship's body

Figure 41: Installation of the compass enclosure

The compass enclosure must be installed in such a way that the following requirements are met:

- The 8 supports must all stand on a flat, firm surface.
  If necessary, the user should himself create an intermediate plate (marine quality hardwood or metal) suited to the local conditions.
- The compass enclosure must be screwed to the intermediate plate in a sea-resistant fashion.
- The intermediate plate must also be screwed to the ship's body in a sea-resistant fashion; this fastening is the responsibility of the user of the STD 22 himself.
- The compass enclosure must be mounted so that the digital display can be seen easily after installation, the door of the compass enclosure can be opened and closed easily and the cover of the compass enclosure can be detached.
- The fastenings of the compass enclosure are indicated in the dimensional drawing "Gyro Compass" (110 D 233 HP005) in the appendix to this manual.

The compass enclosure is fastened to the intermediate plate with 6 screws

- for woodscrews ∅11 x length depending on the thickness of the intermediate plate
- for metal screws M10 x length depending on the thickness of the intermediate plate.

The compass enclosure can also be mounted directly on a flat metal surface; in this case, suitable stud bolts (M10) must be welded on; alternatively the compass housing can be fastened on the underlying surface with threaded holes and screws M10-A4.

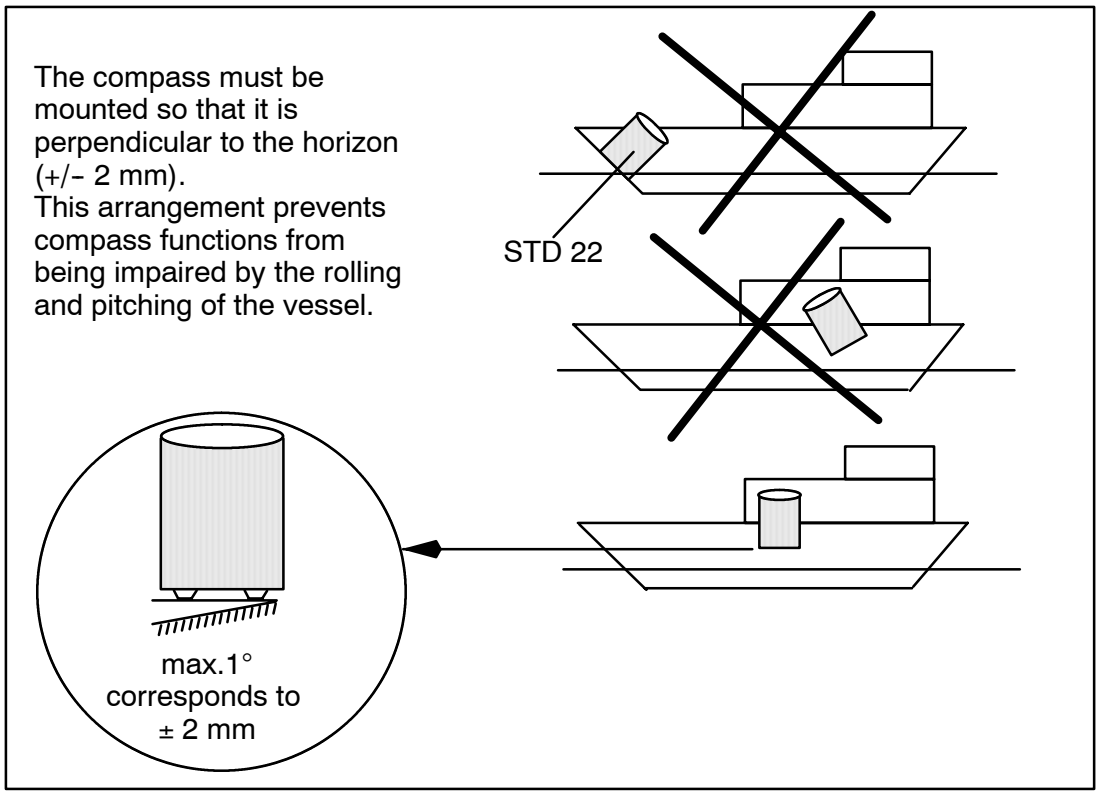

The compass must be mounted so that it is perpendicular to the horizon (+/- 2 mm).
This arrangement prevents compass functions from being impaired by the rolling and pitching of the vessel.
STD 22
max.1°
corresponds to
± 2 mm

Figure 42: Horizontal alignment for installation of the compass enclosure

3.3.1.2 Installation of the gyrosphere

Special tool required:
Suction cup

Installation procedure:

- Undo the six screws (Figure 43/1) fastening the upper and lower halves of the outer sphere (Figure 43/2 and 3).
- Remove both hose-pieces (Figure 43/4) from the pump.

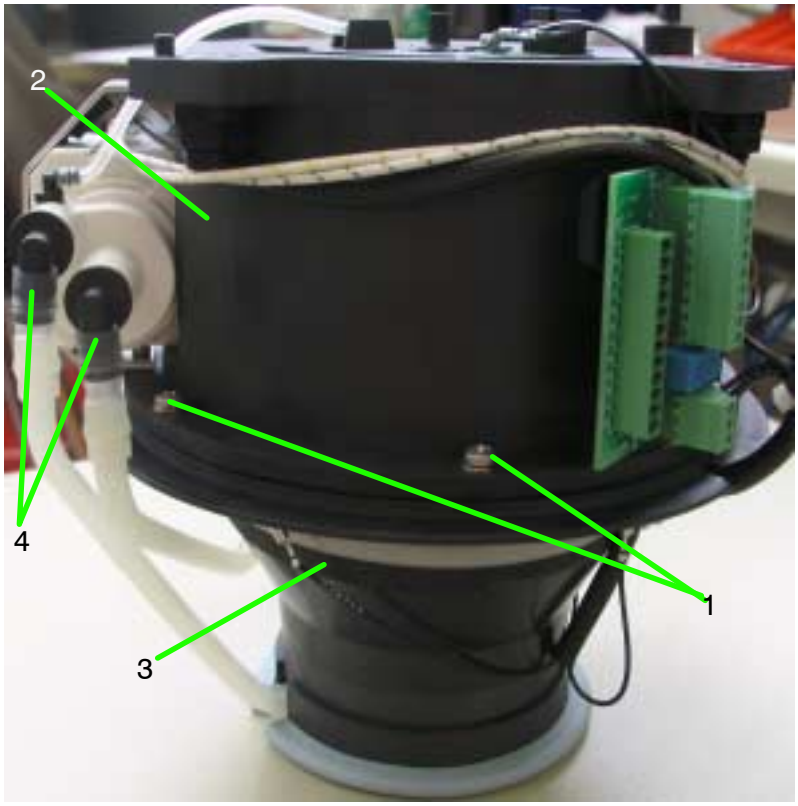


Figure 43: Outer sphere

- Remove the upper half of the outer sphere (Figure 43/2), paying attention to the cable loom from the lower outer sphere to the (Figure 43/3) small PCB (see Figure 44), take the gyrosphere (Figure 44/2) out of the transportation box and carefully insert it using the suction cup (Figure 44/3) in the lower outer sphere (see Figure 44).
- Replace the upper half of the outer sphere on the lower half.

Check that there is a proper seal between the two halves of the outer sphere (see Figure 44/1).

- Retighten the six screws (see Figure 43/1).
- Push both hose-pieces (Figure 43/4) to the pump again

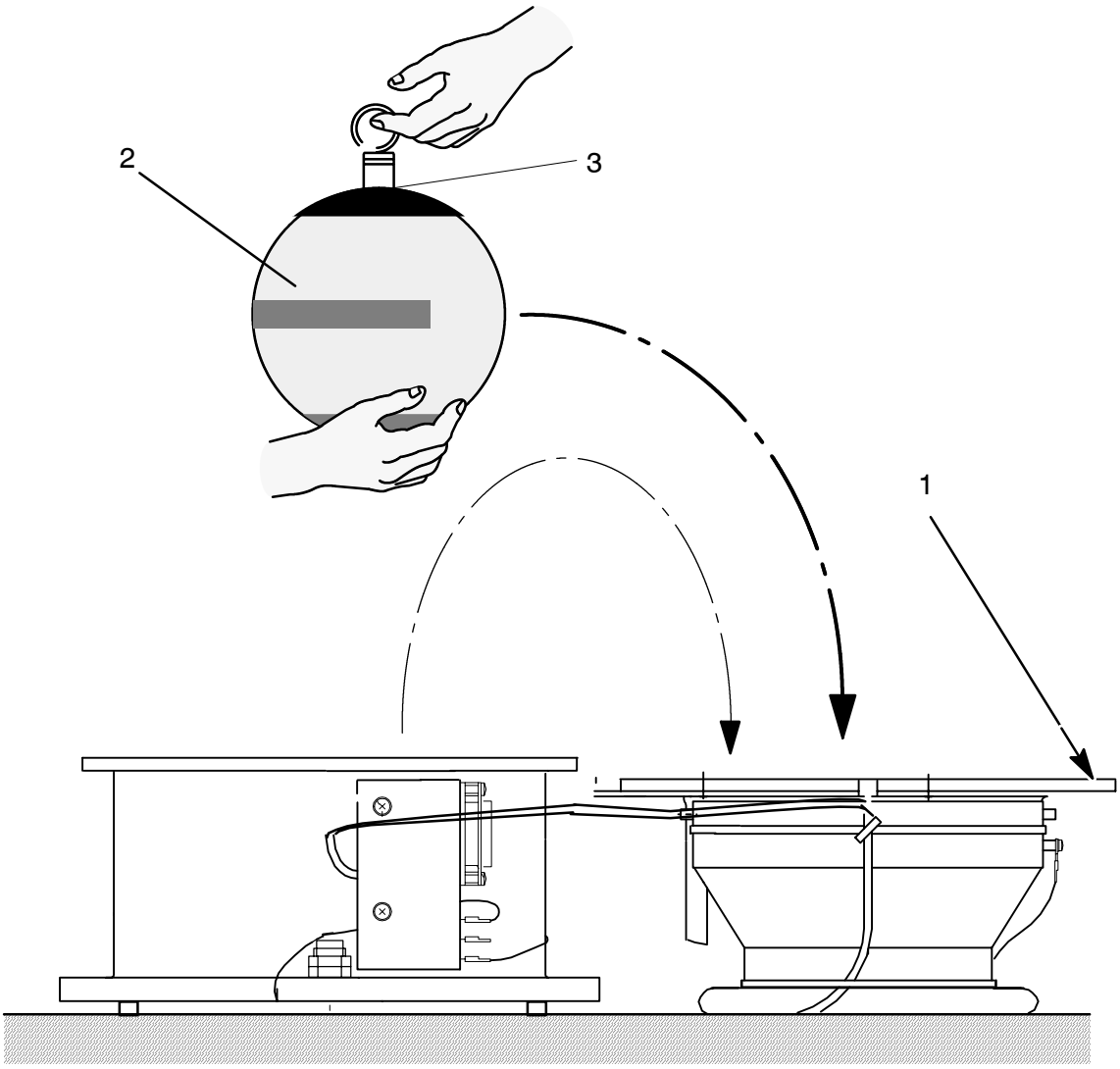


Figure 44: Principle of separating the upper and lower halves of the outer sphere – inserting the gyrosphere

3.3.1.3 Filling with distilled water and supporting liquid.

(see Figure 45)

- Undo the three plastic screws (Figure 45/1-3) on the upper outer sphere

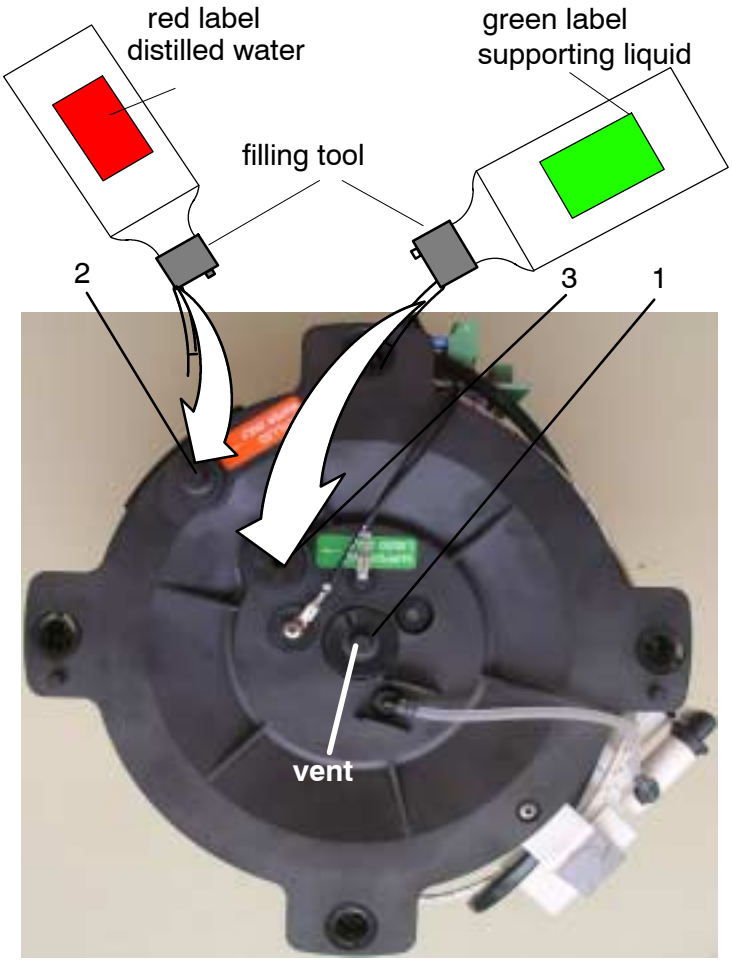
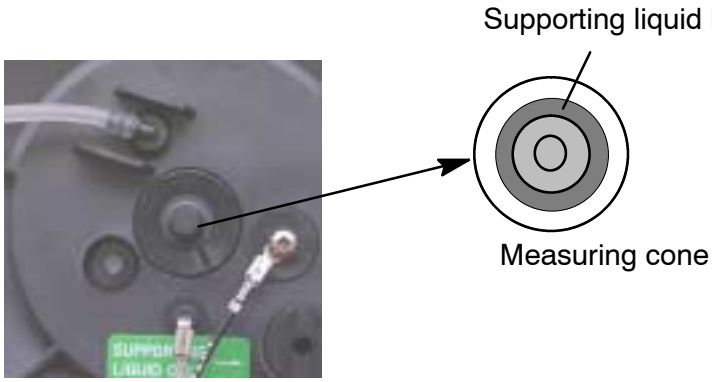


Figure 45: Filling with liquids

- Fit the supplied filling device on the distilled water bottle (red label).
- Pour in all the distilled water (230 cm^3) (look for the identifying label on the outer sphere).
- Re-close the distilled water filling opening with the screw, check that it is properly sealed.
- Remove the filling device from the distilled water bottle and attach it to the supporting liquid bottle (green label).

- Pour approximately 840 cm^3 of supporting liquid in the appropriate filling opening (look for the identifying label).
  The supporting liquid must be at room temperature (over 25° C) and the measuring cone should fill half the measuring range (diameter).
  The following photograph shows the measuring cone for the liquid level.



This picture only shows the situation at the start of operation (after filling for the first time or after changing the supporting liquid); during operation, the dark circle in the measuring cone is smaller.

Figure 46: Measuring cone for supporting liquid level

- Discard any unused supporting liquid; no special measures are needed for disposal.
- Re-close the filling opening for supporting liquid, check that it is properly sealed.
- Re-insert the ventilation screw, check that it is properly sealed.

3.3.1.4 Inserting the outer sphere in the compass enclosure

(see Figure 47)

- Carefully insert the gyrosphere in the compass enclosure:

Pay attention to the two locking pins on the closure.

- Using both hands, hold the outer sphere and guide it under the snap closures (Figure 47/1) on the pendulum joint (Figure 47/2).

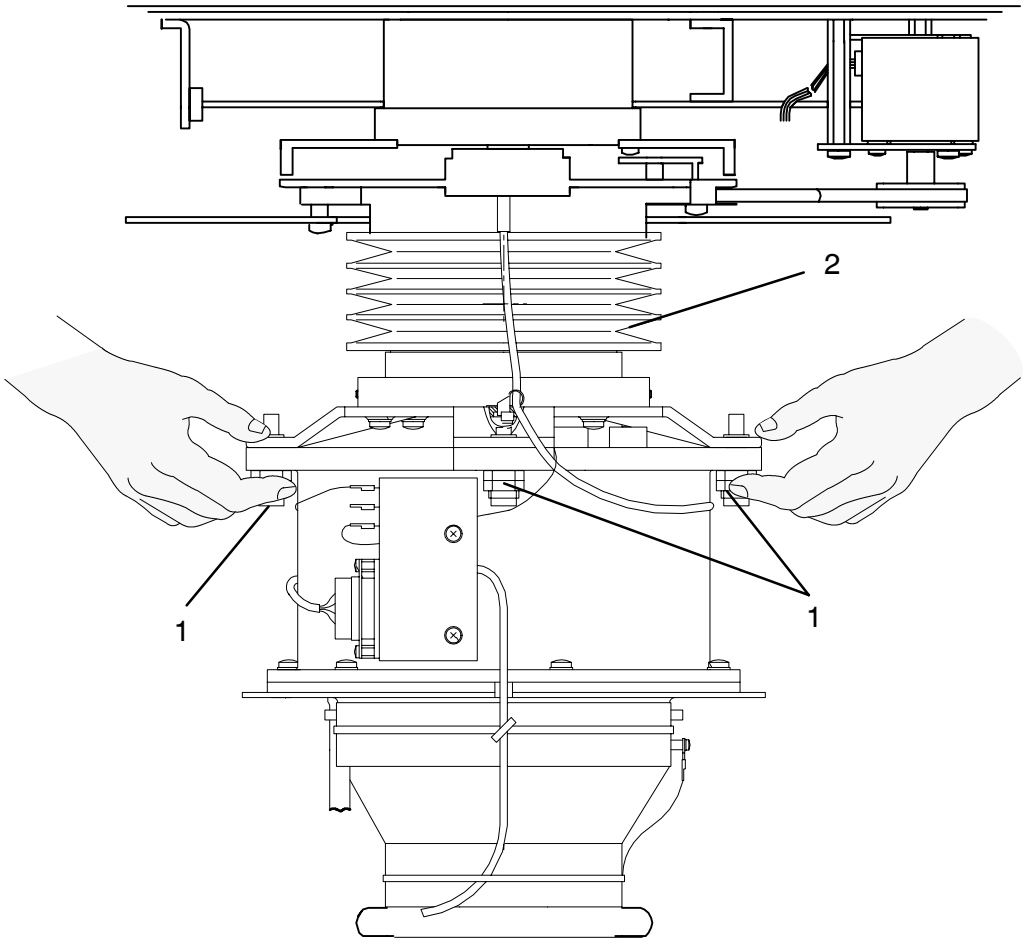


Figure 47: Principle of inserting the outer sphere in the compass enclosure

- Using the thumbs, press down and engage two snap closures (Figure 47/1).
- Turn the outer sphere through 90° and repeat the process with the two other snap closures. The outer sphere is now fastened to the pendulum joint

- Guide the cable around the outer sphere and attach the plugs to the small PCB of the outer sphere, tighten the fastening screws

3.4 Creating cable connections and plug connections

3.4.1 Overview of plug connections and fuses on PCB‘s

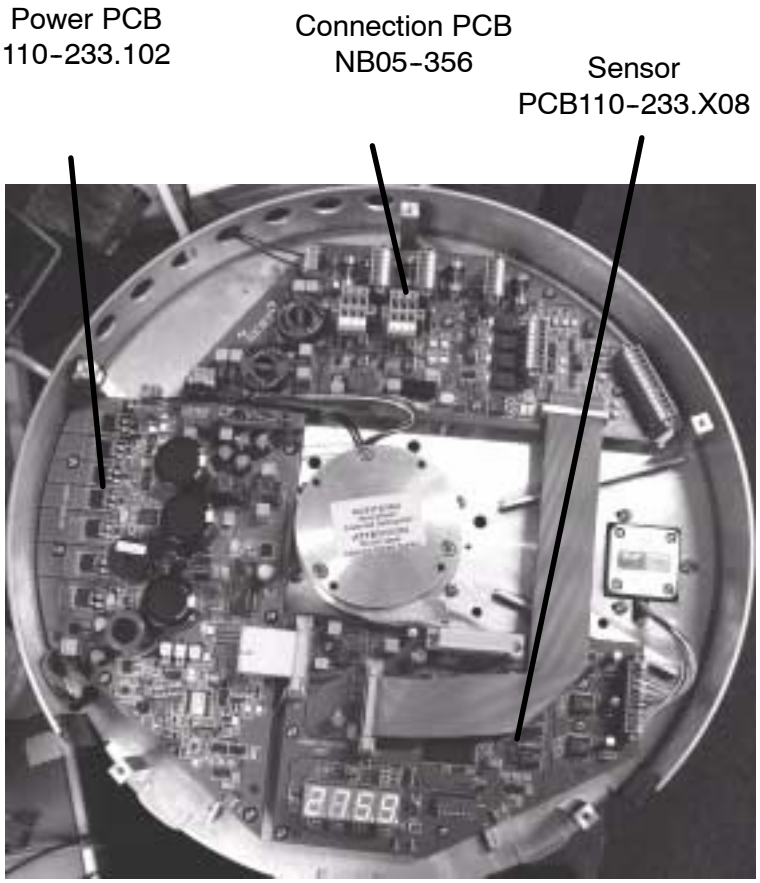


Figure 48: Arrangement of PCB‘s in the STD 22 Compass (cover removed)

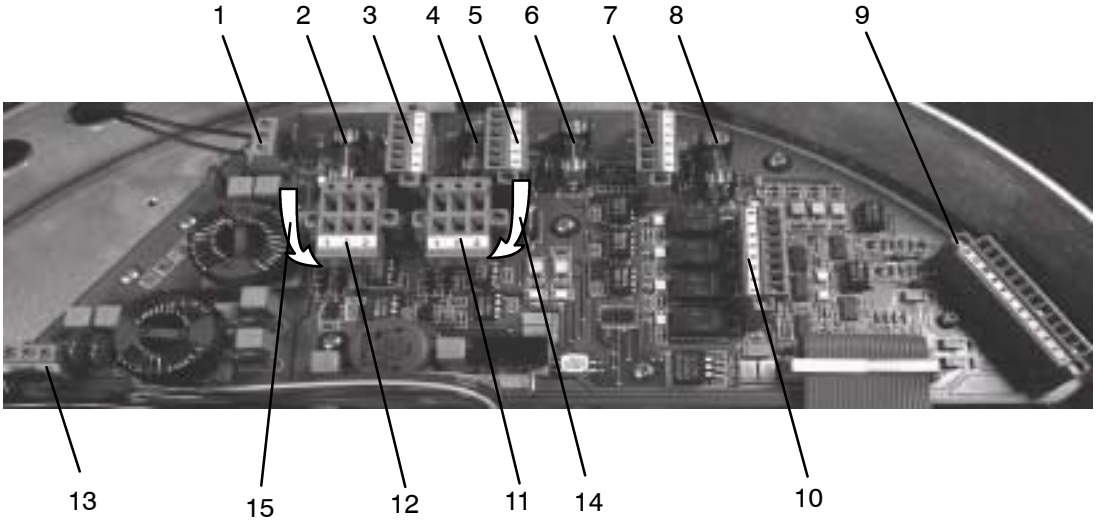


Figure 49: Arrangement of plugs, terminal boards and fuses on the Connection PCB.

(below mentioned table refers to compass STD 22)

1	Terminal L1	– Power supply (24VDC)
2	Fuse E1 (T10A)	– Power supply (24VDC)
3	Plug B2	– Output Channel1 Course Bus/NMEA
4	Fuse E2 (T1A)	– Channel1 +24V
5	Plug B3	– Output Channel2 Course Bus/NMEA
6	Fuse E3 (T1A)	– Channel2 +24V
7	Plug B4	– Output Course Bus
8	Fuse E4 (T1A)	– Course Bus +24V
9	Plug B5	– Input (+24V/Set QS/ Pulse Log/ Pulse Log Dir./NMEA Log/GPS)
10	Plug B6	– Output (QS/SEC/System/Available)
11	Plug B7	– CAN1 bus
12	Plus B8	– CAN2 bus
13	Terminal Board L2	– 24V connection to Power PCB
14	Jumper B31 (for the CAN2 bus terminating resistor)	
15	Jumper B32 (for the CAN1 bus terminating resistor)	

3.4.2 Creating a cable connection from STD 22 Compass → Distribution Unit

NOTE: The installation and commissioning of the Distribution Unit are described in the Distribution Unit manual.
To create cable connections to the Distribution Unit, see also Cable and Connection Diagram 110-233. HP009.

This connection is made using cables with CAN bus plugs at both ends
(see also section 3.4.2.2 - Connecting the CAN bus plug).
For each CAN bus, a screened 2-core twisted cable with a conductor cross-section of $\geq 0.5mm^2$ must be used.

There are 2 redundant CAN busses:
- CAN1 bus
- CAN2 bus

Each CAN bus must be connected.
Missing or disconnected plug connections will cause an error message to be sent to the Operator Unit (see manual 3648, Operator Unit 130-613).

The plugs must be inserted on the Connection PCB as shown in Figure 49.

If several STD 22 gyro compasses are combined with one another, they are connected to each other from compass to compass via the CAN bus.
For this purpose, each device is equipped with 2 sockets (CAN1 = B7 and CAN2 = B8) (e.g. CAN1 and CAN 1 OUT), whereby CAN OUT does not have to be connected if the compass in question is installed virtually as a terminal device.
The compass or compasses can also be connected via any other CAN bus user.

When inserting plugs, be sure not to get the plugs mixed up.
The CAN1 bus must always be connected to the CAN1 bus of the subsequent device.

If a compass is operated within a CAN bus configuration as a terminal device on the CAN bus, terminating resistors must be activated for each CAN bus
(see section 3.4.2.3).

3.4.2.1 Connecting to the power supply (Distribution Unit)

The STD 22 Compact Compass operates at 24VDC.
This voltage is generated via the Distribution Unit or fed directly to the compass.

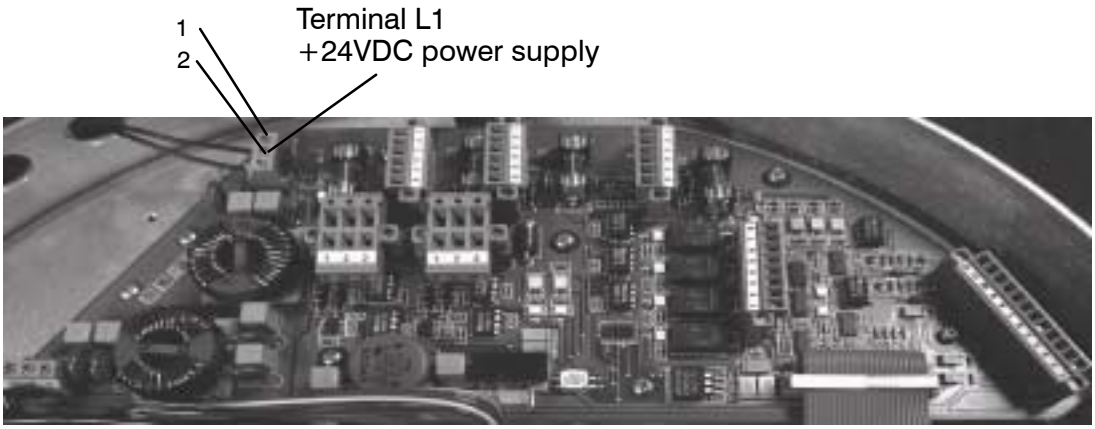


Figure 50: Connection of the +24VDC power supply

The 2-core cable that is used should have a conductor cross-section of $\geq 2.5mm^2$.

At terminal L1 (see Figure 50), connect a power supply
of +24VDC at terminal 1
0V at terminal 2.

3.4.2.2 Connecting the CAN bus plug

For each CAN bus, a screened 3-core twisted cable with a conductor cross-section of ≥ 0.5mm² must be used.
All the CAN bus connections to be used are identical.

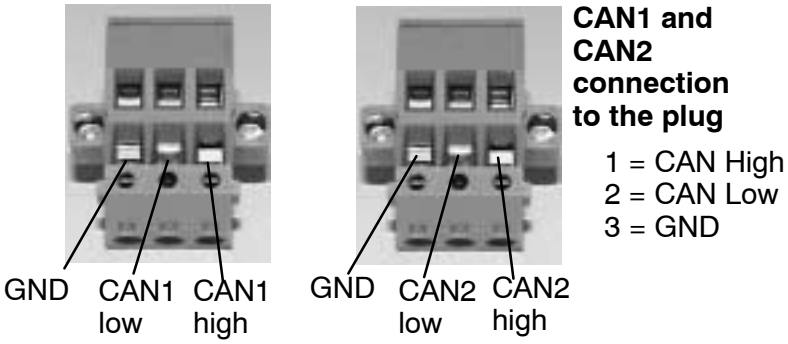


Figure 51: CAN bus plug

The screening of the cable is connected to the enclosure earth.

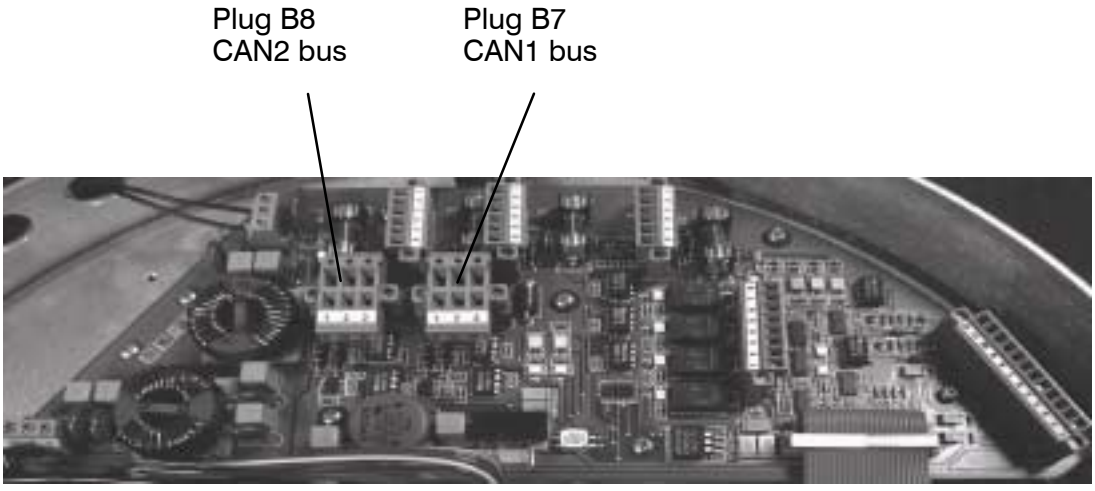


Figure 52: CAN1 and CAN2 connections in the STD 22 Gyro Compass

3.4.2.3 Setting the jumpers for the CAN bus

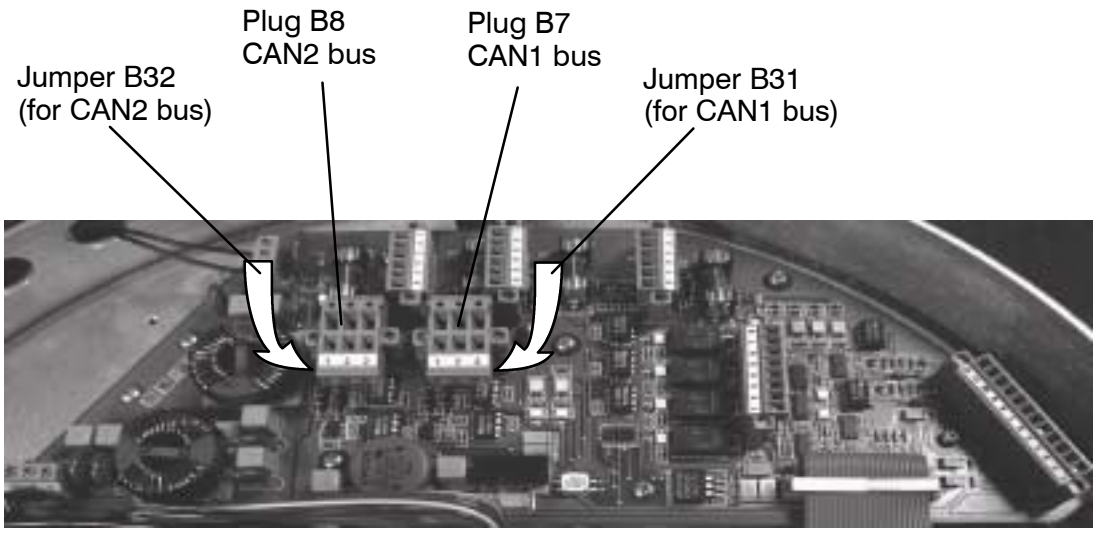


Figure 53: Jumpers B32 and B31 for CAN1 and CAN2 in the STD 22 Gyro Compass

If a compass is to be used as a terminal device in a CAN bus application, both jumpers (B32 and B31) must be inserted. These jumpers activate the terminating resistor at the end of each CAN bus.
Each end of the CAN busses must be terminated with a terminating resistor.

Failure to insert jumpers (open bus) will cause sporadic error messages from the bus concerned (see also manual 3648, Operator Unit 130-613).

3.4.2.4 Connecting the compass to earth

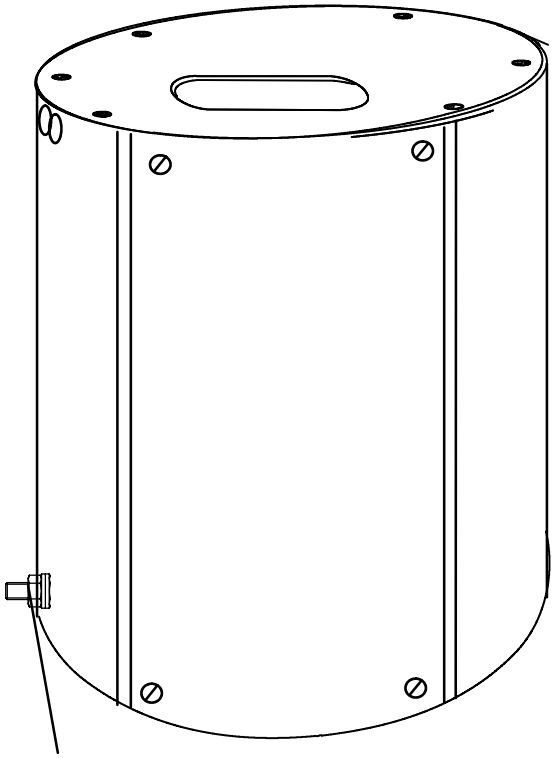


Figure 54: Connection of compass to earth

An earth connection (ship's earth) must be made using the earthing screw shown in Figure 54.
The earth connection must have a common reference to the other components (Operator Unit, Distribution Unit and repeater compasses).

3.4.3 Switching on, settling and adjustment

The STD 22 Compass switches on when the power supply is activated on the main control panel for the Distribution Unit (once the Distribution Unit has been connected to the STD 22 Compass).

3.4.3.1 Checks on the compass

Measuring the compass power supply voltage (on the compass).
This voltage must fall within the tolerance range (15 VDC to 36 VDC).

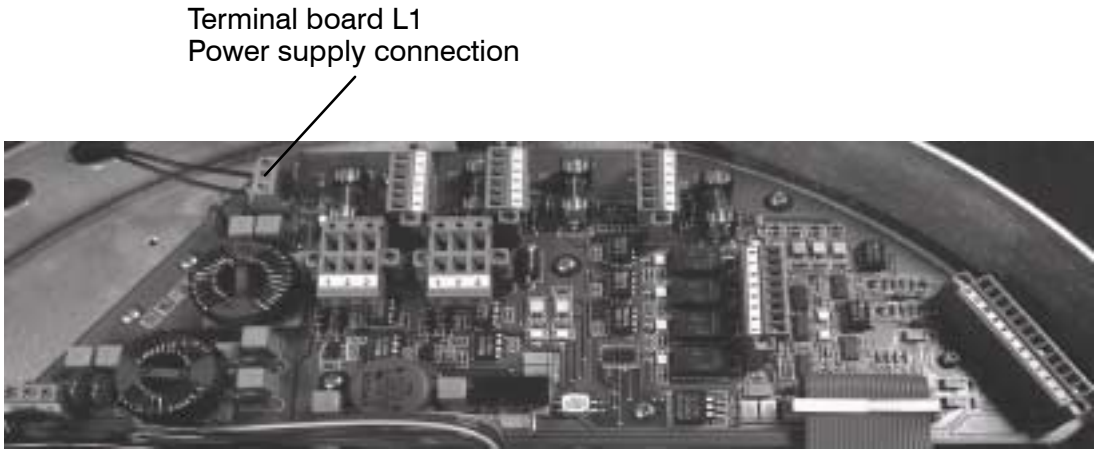


Figure 55: Measuring the compass power supply voltage

Terminal board L1 terminal 1 +24VDC
Terminal board L1 terminal 2 0V

Note: The absolute lower limit for the power supply voltage is 12VDC, the absolute upper limit is 40VDC!
When connecting cables, ensure that these values are adhered to.

Checking the DIP switch settings on the compass (see Figure 56):

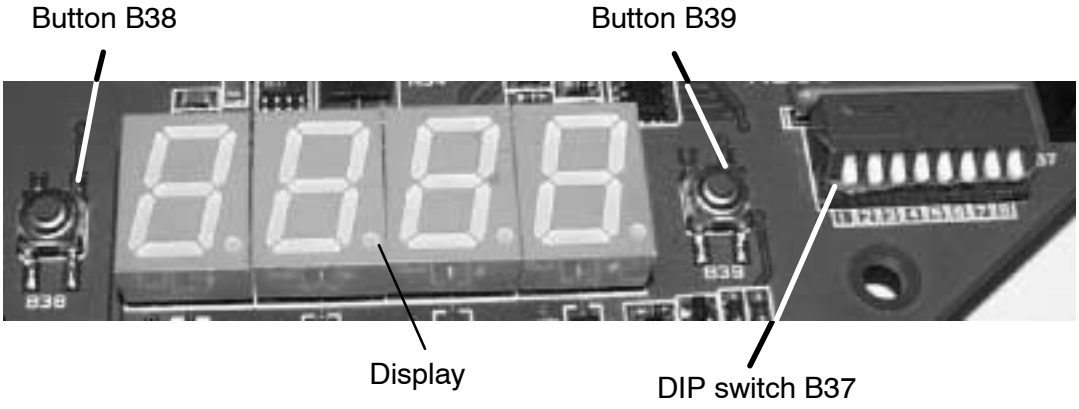
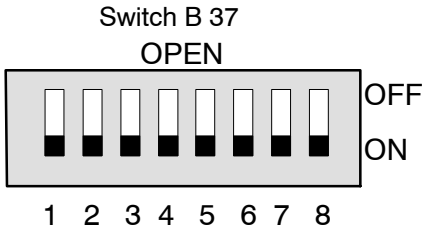


Figure 56: Checks on the compass before putting into operation

All DIP switches in the “ON” position



3.4.3.2 Switching on the compass

The compass goes into the heating stage for the first 30 minutes (this period will vary depending on the temperature of the supporting liquid), during which time the course output of the compass is unavailable and the letter “h” is displayed as the leading sign on the digital display (see Figure 57).

During the settling in stage (for 3 hours after switching on), the course output of the compass may be used; **however, the deviation from the actual course may still be considerable (as well as the connected course receiver)**.
During this period, an additional dot appears in the digital display of the compass (see Figure 58).
(The “Quick Settling” option reduces the settling in stage to approximately 1 hour).

After 3 hours from switching on, the compass course may be used.
Approximately 3 hours after switching on, the compass has a accuracy of <2 °.

After appr. 5 hours (after switching on), the compass has an accuracy of von 0,1° x $^{1}/_{cos}$ latitude.

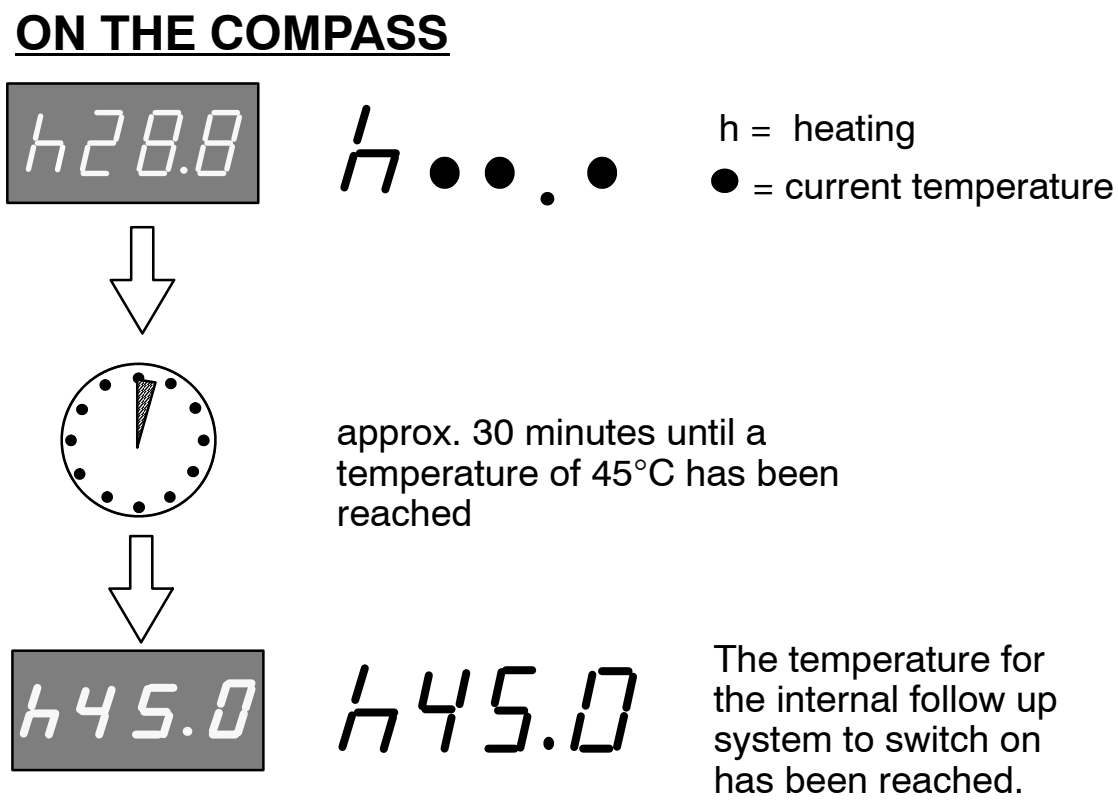

ON THE COMPASS
h28.8
h = heating
● = current temperature
approx. 30 minutes until a temperature of 45°C has been reached
h45.0
The temperature for the internal follow up system to switch on has been reached.

Figure 57: Indications on the compass during the heating stage

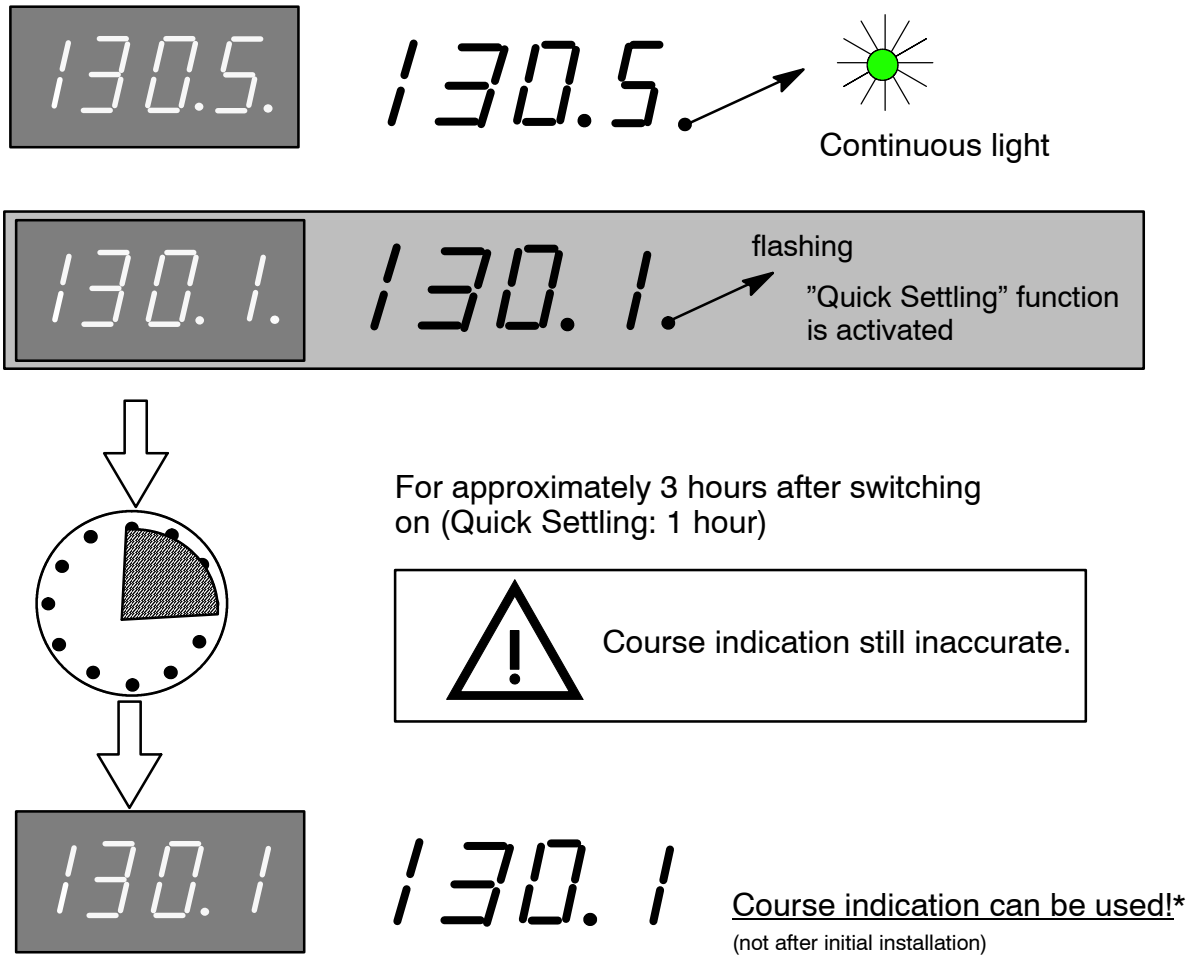


Figure 58: Indications on the compass during the settling in stage

3.4.3.3 Setting the compass zero (reference course)

Once the compass has been installed, it must be aligned according to its installation location. The compass zero is set using DIP switch B 37 and buttons B 38 and B 39.
The compass must have been in operation for at least 5 hours before the compass zero is set.

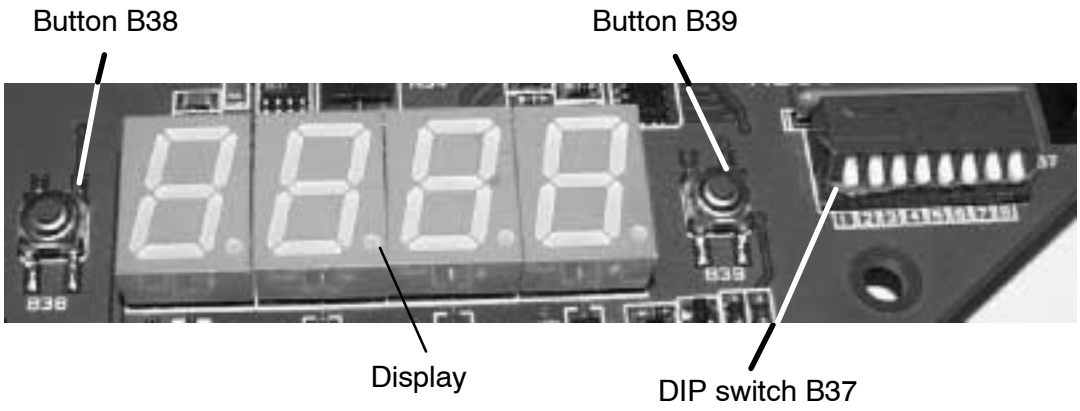


Figure 59: DIP switch B37 and buttons B38/B39

The reference course to be set is determined from the ship's fore-and-aft line (e.g. take a bearing or obtain the pier course from the sea chart).
This reference course is entered according to the following procedure.

- Set DIP switch B37 "1" to the "OFF" position.
  The digital indicator is now indicating "ALEr" = Alignment Error
- Press button B38 or button B39 until the heading you require is displayed (B38 changes the value downwards and B39 changes it upwards).
- If you hold down the button the speed at which it changes will increase.
  Set DIP switch B37 "1" to the "ON" position. This saves the set value in the compass.
- After the reference course has been set, read the alignment error (see next section).

(See also Figure 60)

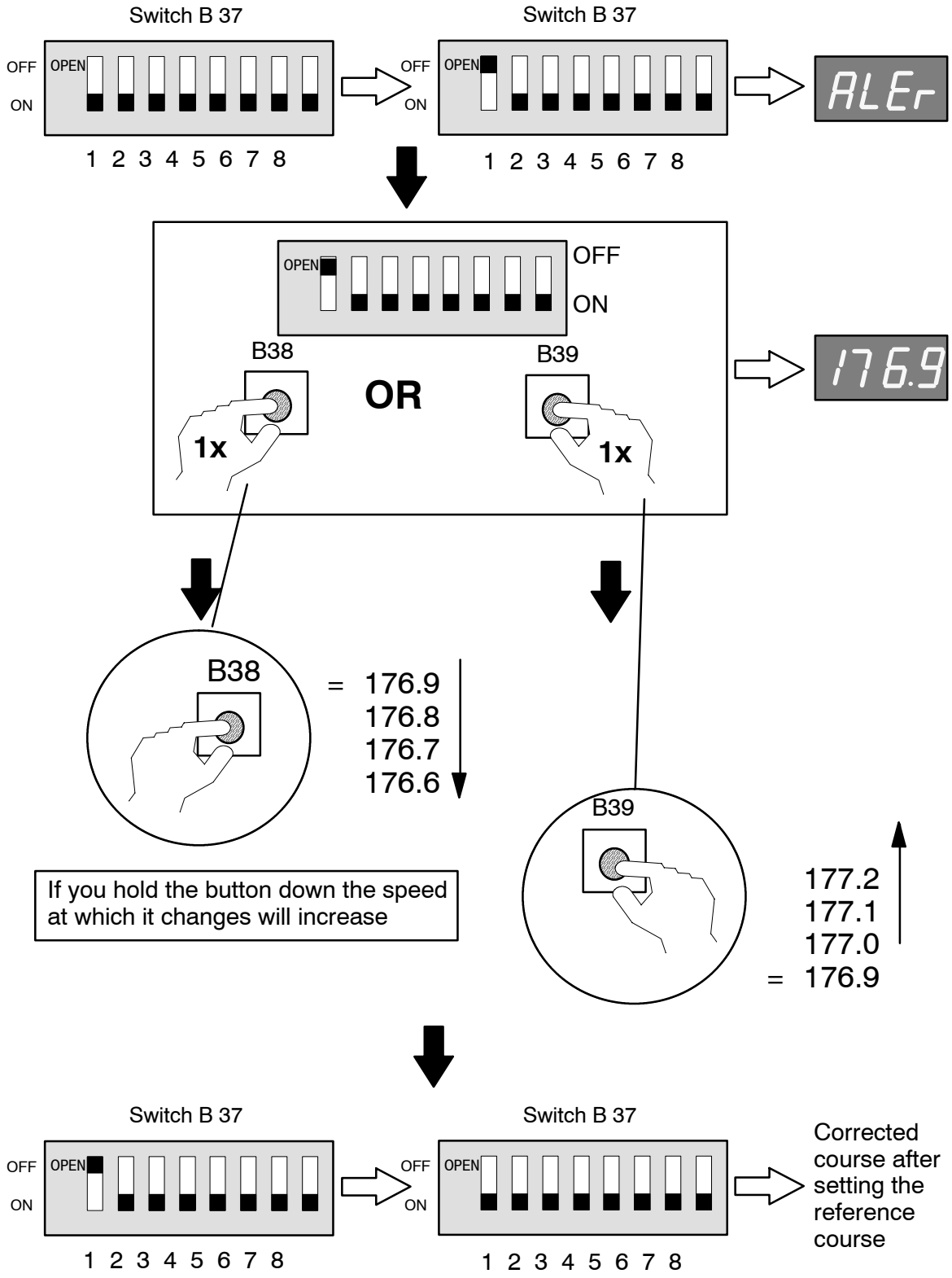


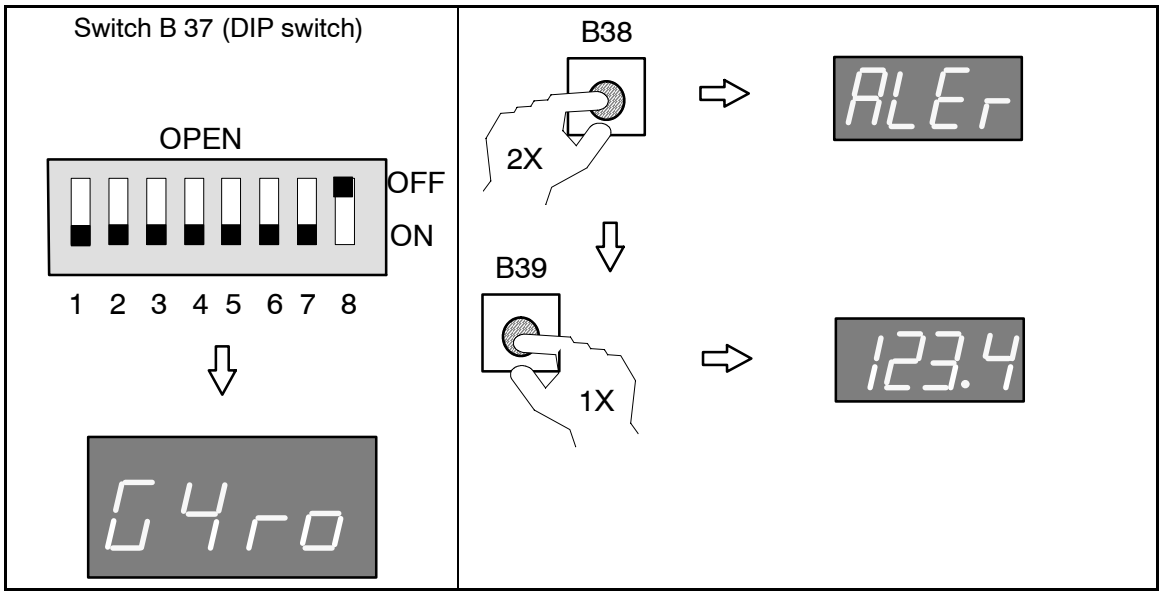
Figure 60: Procedure for setting the compass zero

3.4.3.4 Reading the alignment error

The alignment error must be entered in the table provided for that purpose on the inside of the cover.

Alignment Error	
123.4	

Figure 61: Table at the cover (inner side)



DIP switch “8” in “OFF” position.

NOTE: It is essential to enter this value, because the alignment error will be needed if the sensor electronics are replaced, in order to determine the reference course for the new PCB.

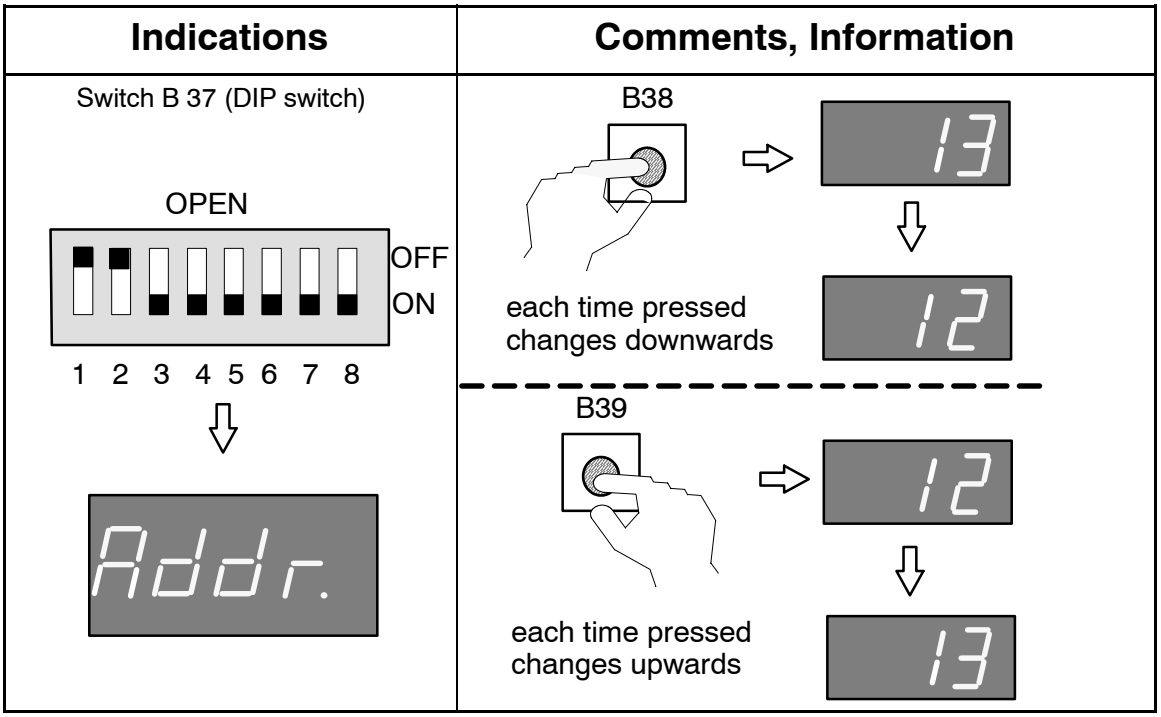
DIP switch “8” in “ON” position.

The STD 22 Compass is ready for use.

Replace the cover of the compass and screw it tight.

3.4.3.5 Setting the CAN bus address

Every CAN bus user must be reachable via an address.
This address may be assigned in the CAN bus system only once.
In the gyro compass, this address is set with the DIP switch.
The CAN bus address for compasses can be set within a range from $10_{(10)}$ to $19_{(10)}$.
The address $00_{(10)}$ may not be used.



Below mentioned table shows the agreement for the CAN bus addresses within a compass system.

Device(s)	CAN-Bus-Address
Operator Units	01 to 09
Sensors (Gyro, GPS)	10 to 19
Distribution Units	20 to 29
Repeaters	30 to ...

3.4.3.6 Adjustment of essential operating modes

Unscrew and remove the cover of the compass enclosure.

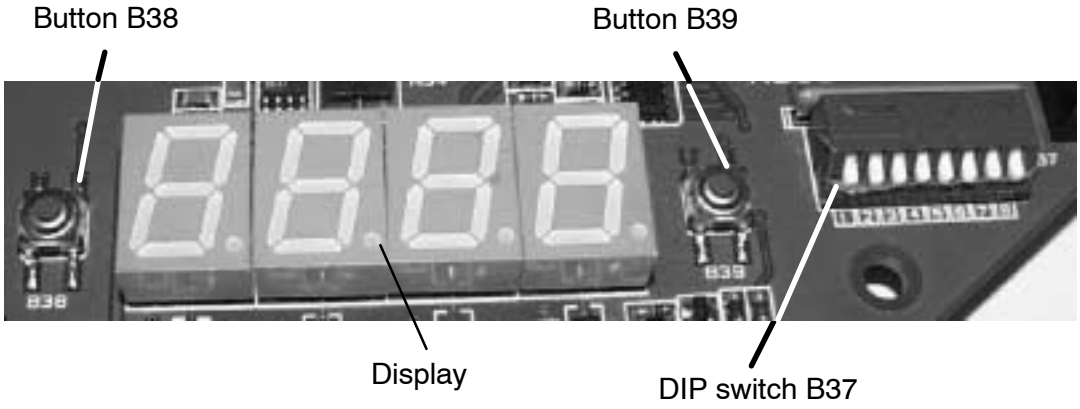
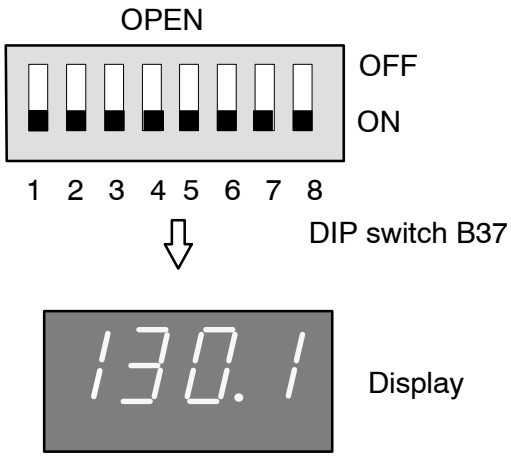


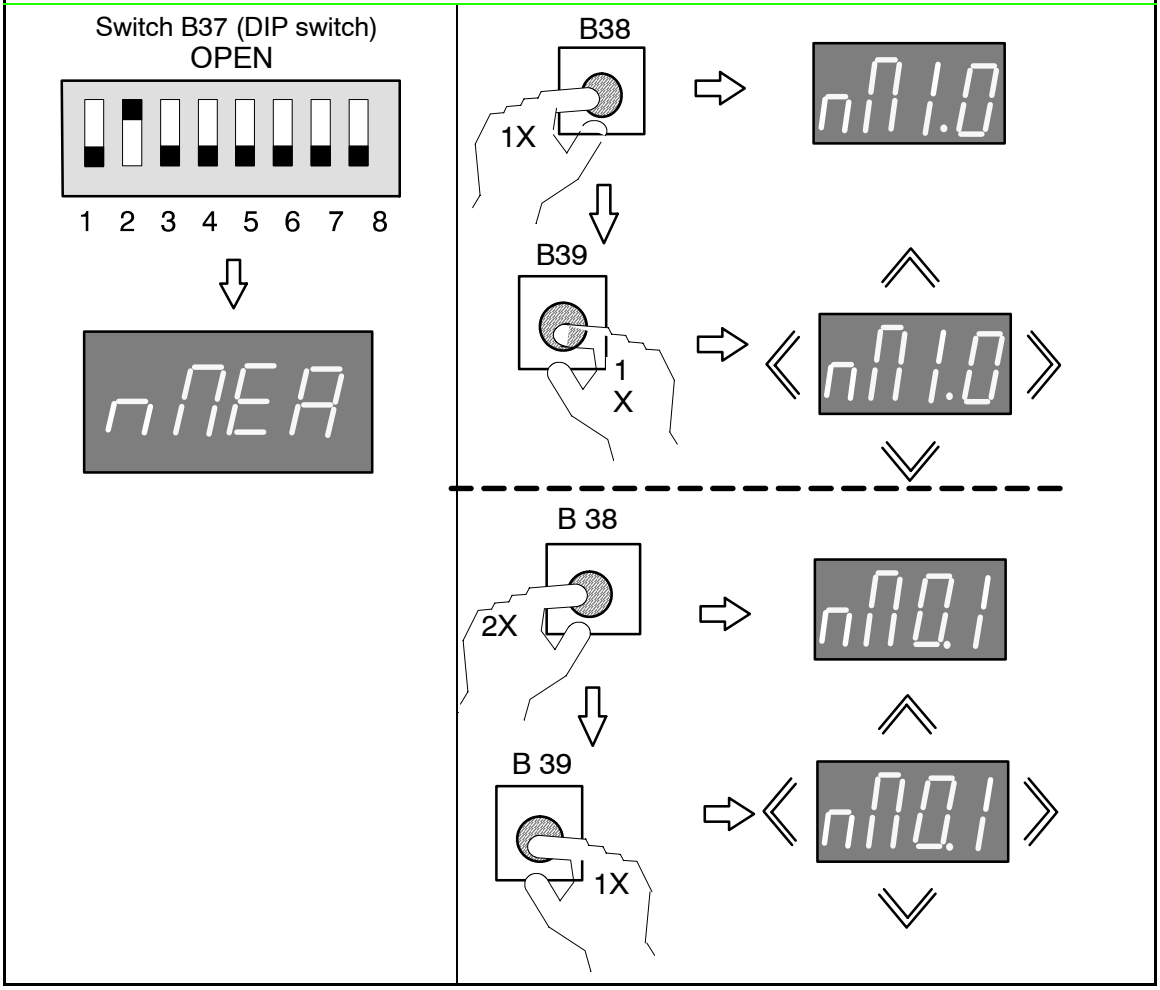
Figure 62: DIP switch B37 and button B38/B39

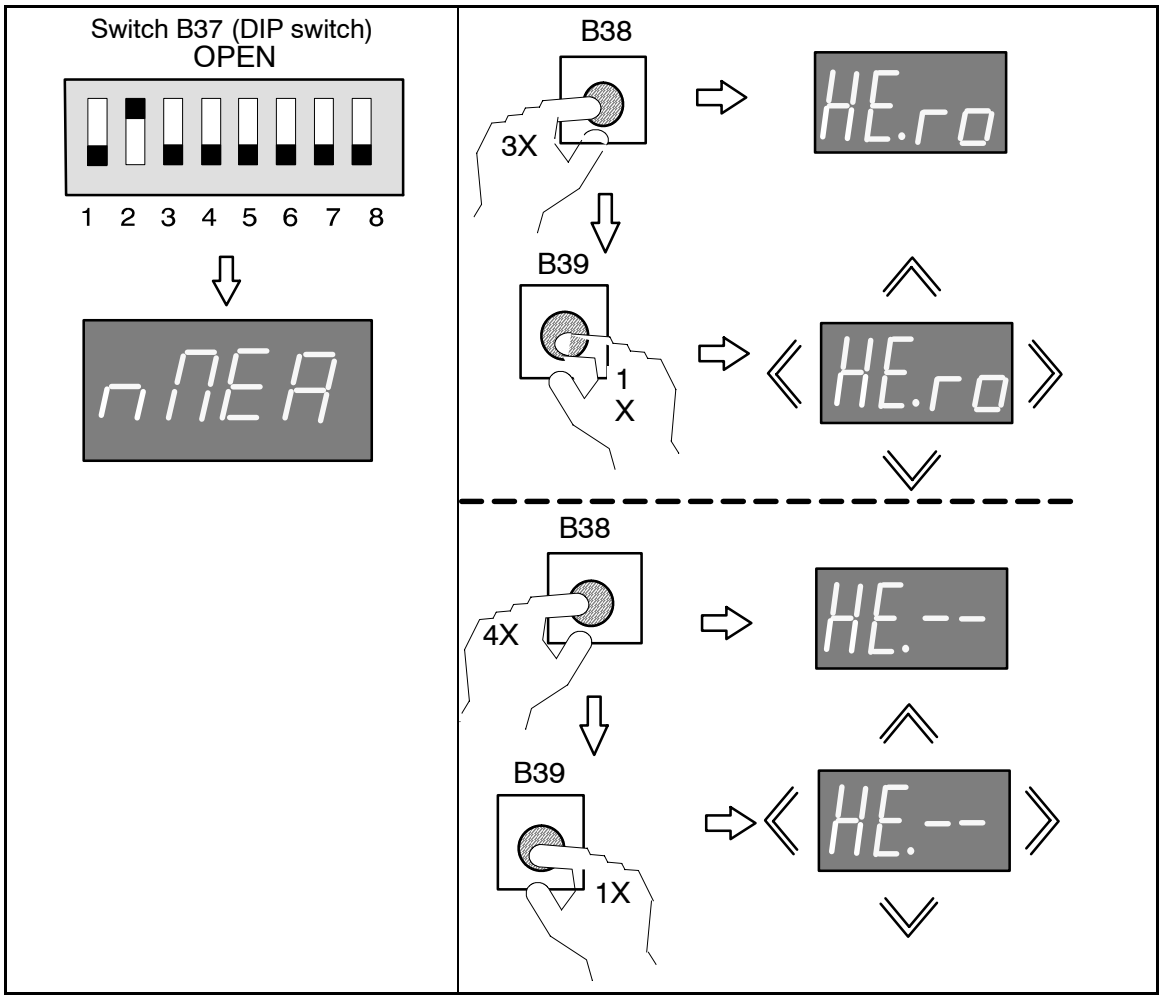
Initial status:

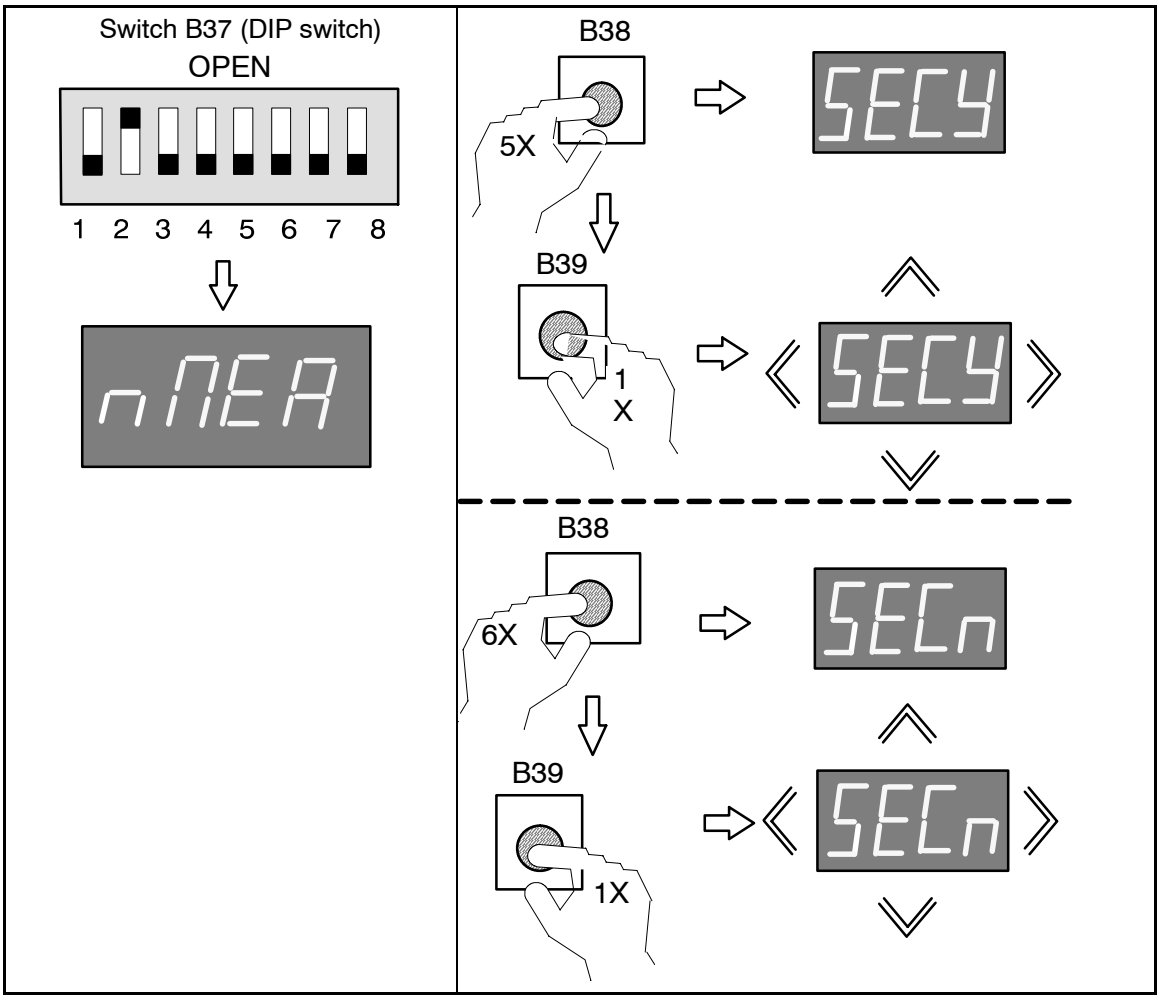


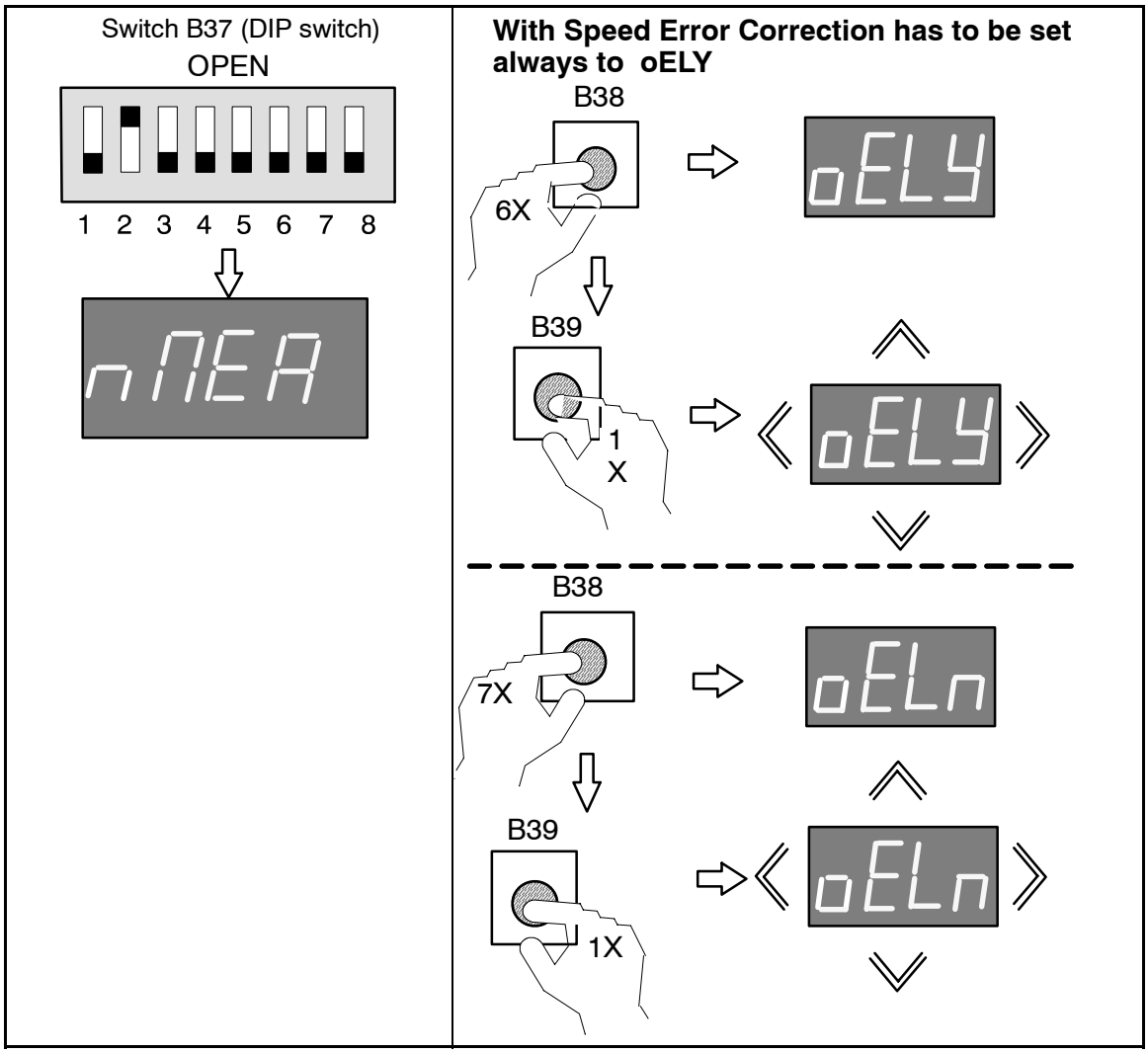
Set the repetition rate of the NMEA heading data output, the output with or without ROT (Rate of Turn), with or without oil residual error for the speed error correction and the setting of a connected Data Distribution Unit (not for STD 22 Compact Gyro Compass).

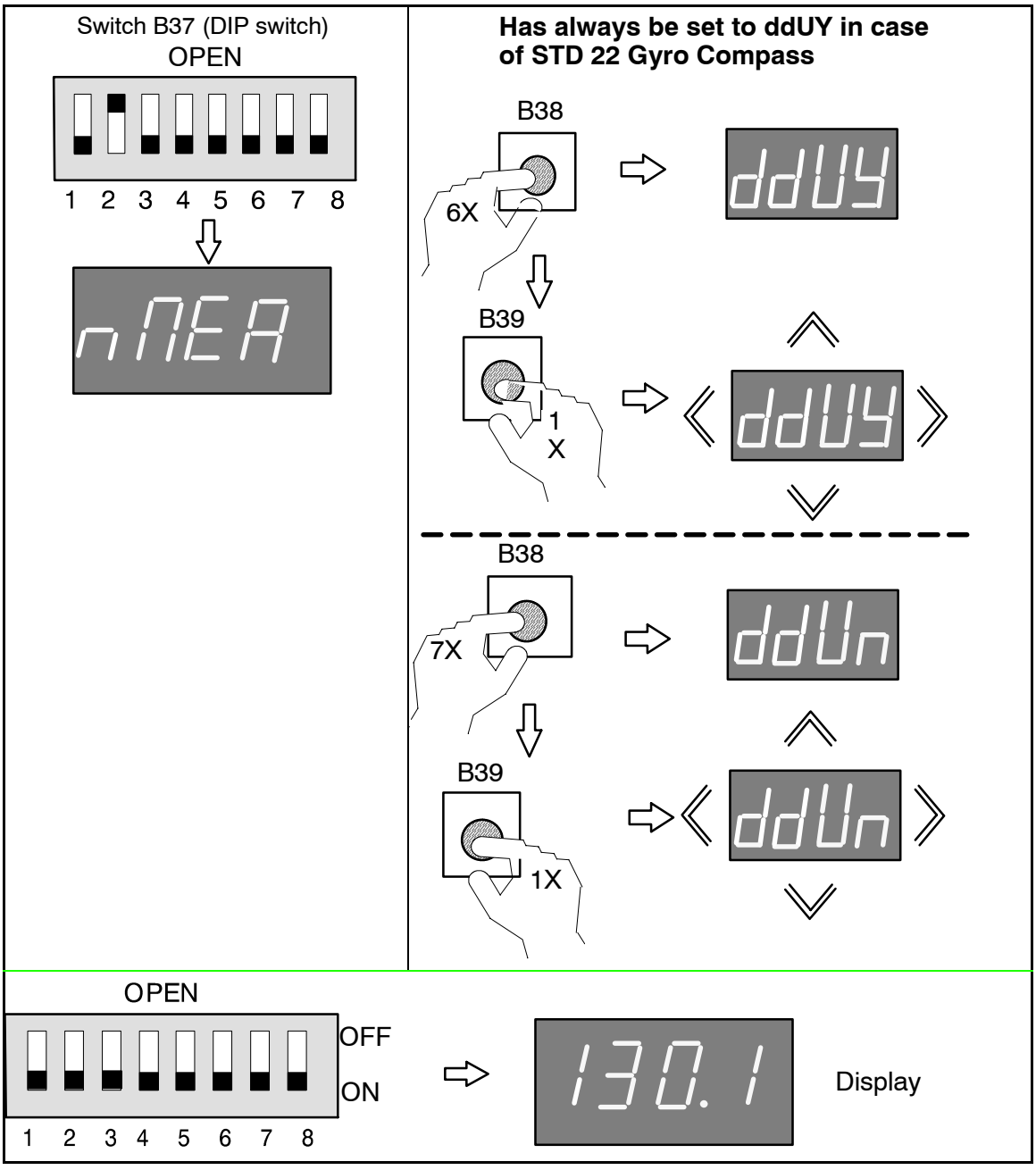
1.0 heading data transmission 1 x per second
0.1 heading data transmission 1 x per second
HE.ro heading with ROT.
HE.-- heading only
SECY heading data incorporating Speed Error Correction
SECn heading data without Speed Error Correction
oELY Speed Error Correction with oil residual error **(recommended setting)**
oELn Speed Error Correction without oil residual error
ddUY with connected Data Distribution Unit
ddUn without Data Distribution Unit **(setting for STD 22 Compact Gyro Compass absolute necessary)**
The indications in the flashing display are selected.




Switch B37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
nMEA
B38
3X
HE.ro
B39
1
X
HE.ro
B38
4X
HE.--
B39
1X
HE.--


Switch B37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
nMEA
B38
5X
SECY
B39
1
X
SECY
B38
6X
SECn
B39
1X
SECn


Switch B37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
nMEA
With Speed Error Correction has to be set always to oELY
B38
6X
oELY
B39
1
X
oELY
B38
7X
oELn
B39
1X
oELn


Switch B37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
nMEA
Has always be set to ddUY in case of STD 22 Gyro Compass
B38
6X
ddUY
B39
1 X
ddUY
B38
7X
ddUn
B39
1X
ddUn
OPEN
OFF
ON
1 2 3 4 5 6 7 8
130.1
Display

3.4.3.7 Function check on externally connected course receivers

(not implemented at the present time)

Unscrew and remove the cover of the compass enclosure.

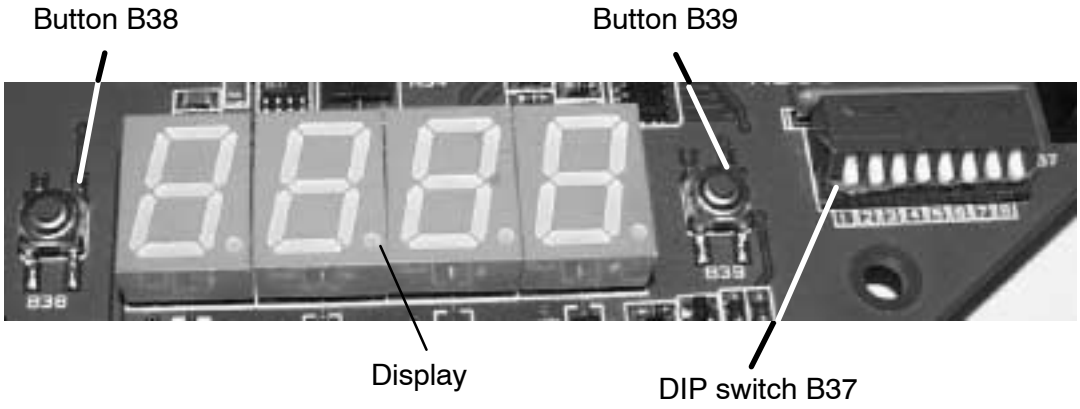
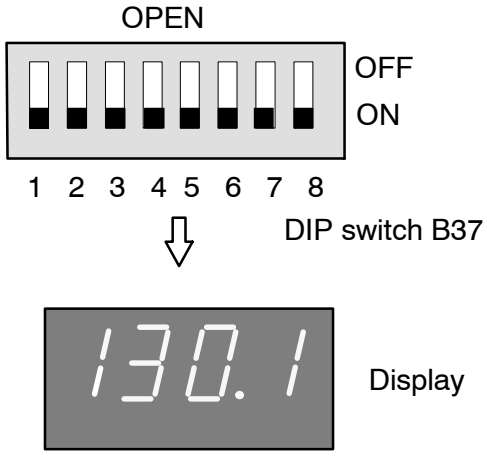
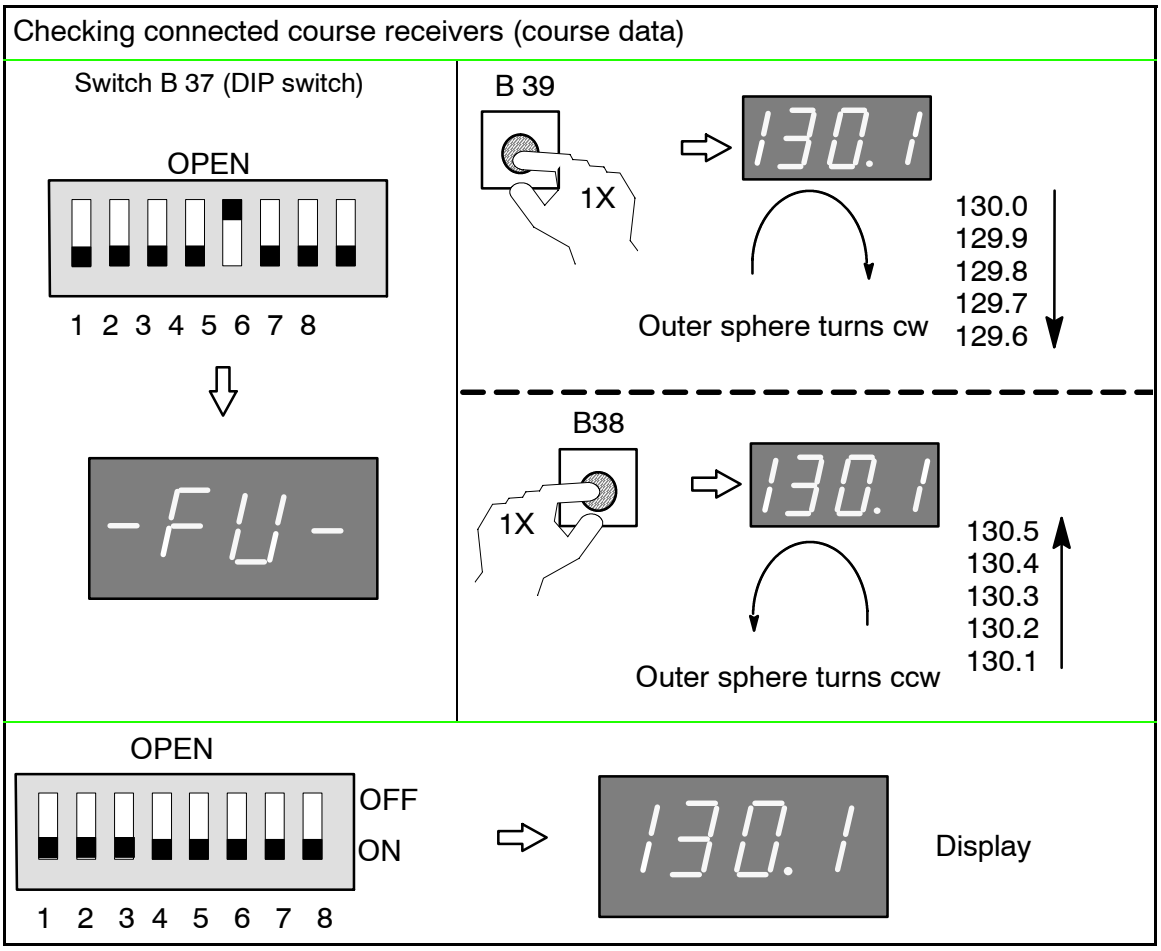


Figure 63: DIP switch B37 and button B38/B39

Initial status:




Checking connected course receivers (course data)
Switch B 37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
-FU-
B 39
1X
130.1
Outer sphere turns cw
130.0
129.9
129.8
129.7
129.6
B38
1X
130.1
Outer sphere turns ccw
130.5
130.4
130.3
130.2
130.1
OPEN
OFF
ON
1 2 3 4 5 6 7 8
130.1
Display

4 Fuses, jumper, LED‘s, buttons and plugs

The meaning and the location of fuses, jumper LED‘s, buttons and plugs of the 3 PCB‘s:

Connection PCB	NB05-365
SPG. Versorgung STD22	110-233.102
Sensor PCB	110-233.X08

is given in the annex.

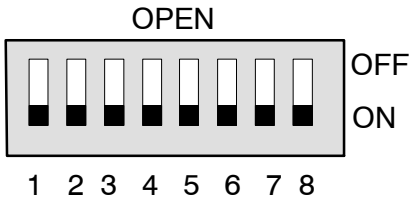
After removal of the cover this information can be helpful to locate a fault.

5 DIP SWITCH settings

The facilities described below for entering settings and obtaining status information may only be used by suitably trained staff.
In particular, information and settings which are clearly identified as “service only” are only to be used by appropriately trained personnel.
Following adjustments and settings refer to the STD22 Compact Gyro Compass as well as for the STD 22 Gyro Compass.
Exceptions are marked.

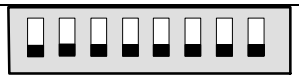
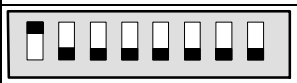
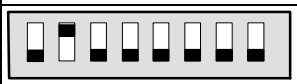
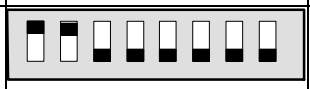
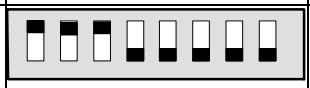
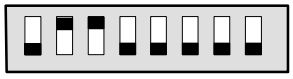
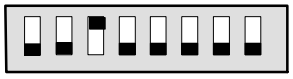
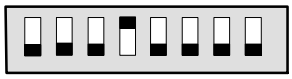
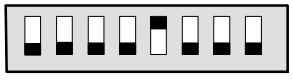
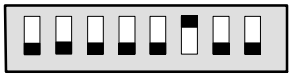
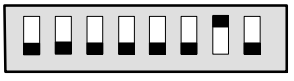
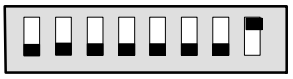
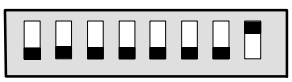
With all DIP switches set to the “ON” position, the current heading is displayed again and all settings that have been made are stored in the compass.

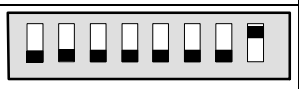
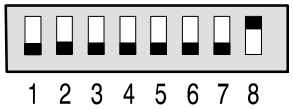
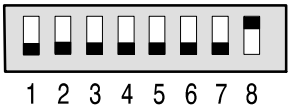
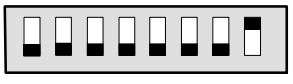
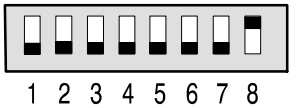
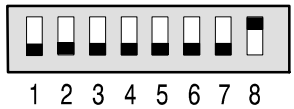
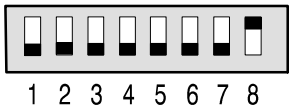
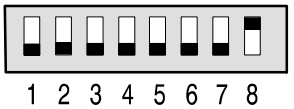
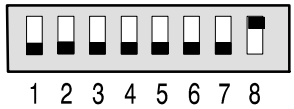
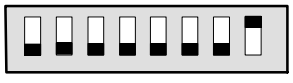
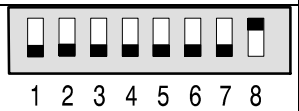
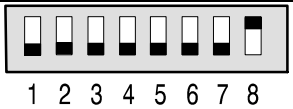
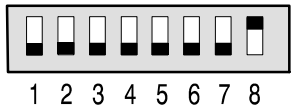
Switch B 37 (DIP switch)

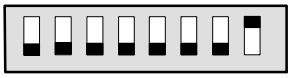
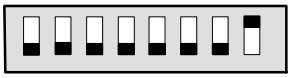
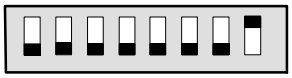
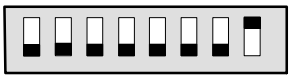
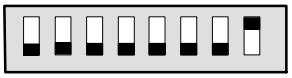
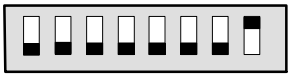
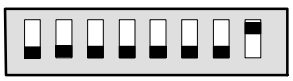
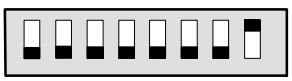
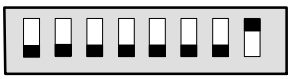
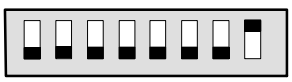
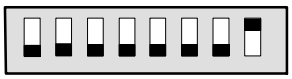
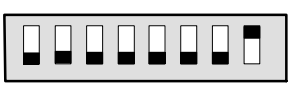
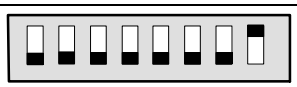


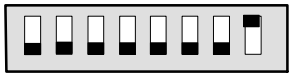
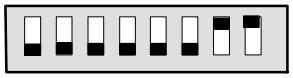
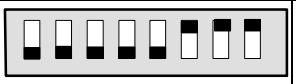
The individual switches are moved up to turn them “OFF” and down to turn them “ON”.

5.1 Overview of functions of all DIP switch settings

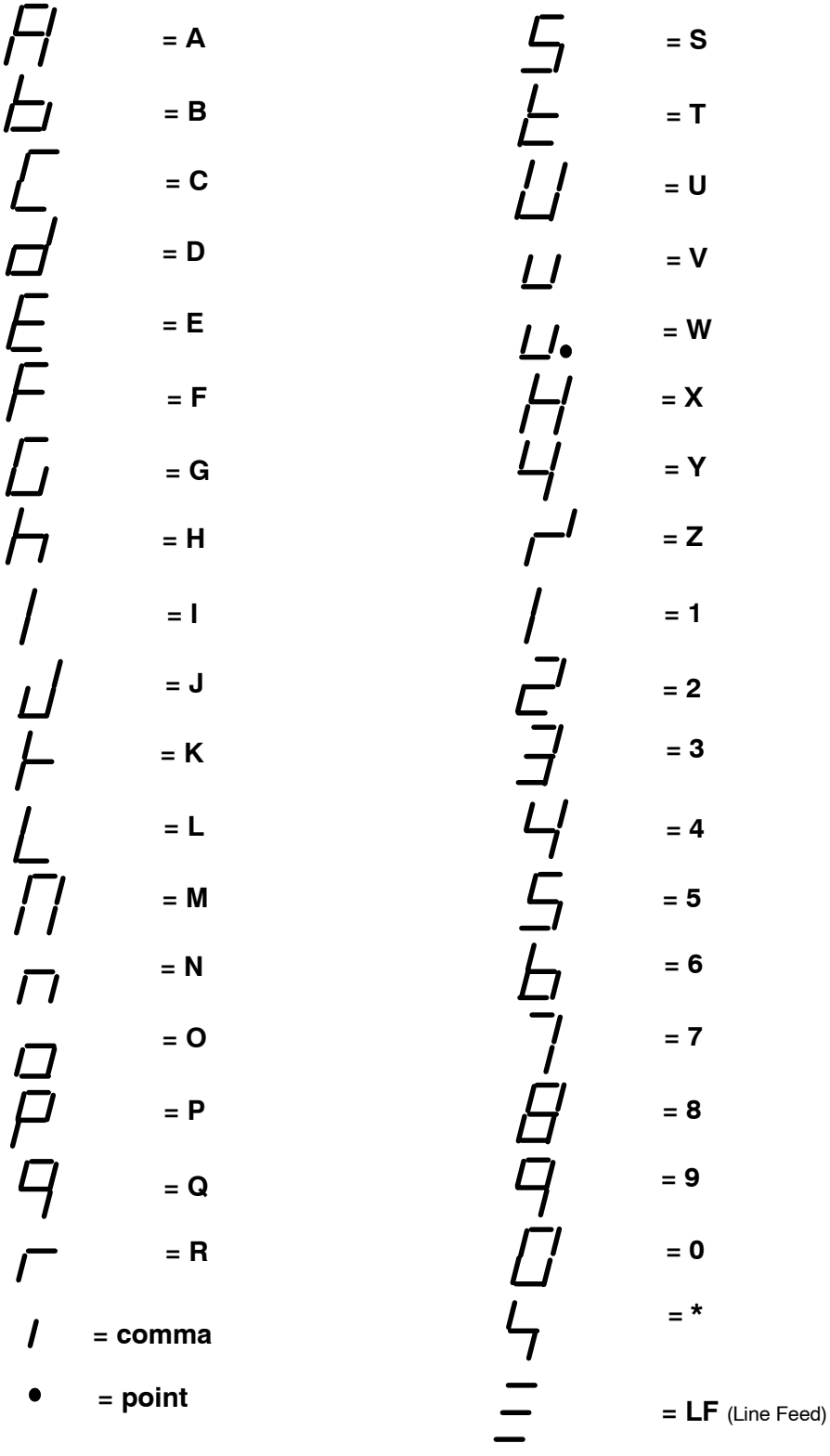
Serial no.	DIP switch setting	Function
1		Normal operation
2		Setting compass zero
3		Set the repetition rate (1s/100ms) of the NMEA heading data output and the output with or without ROT
4		Set the CAN bus address (for gyro compass STD 22 only)
5		Set the interfaces for Channel 1 and Channel 2 (compass outputs)
6		Set the ROT turning direction (Port +; STB –)
7		Bypass the progress status **(Service only)**
8		Set the speed source for SEC
9		Check connected course receivers (course data) (not implemented at the present time)
10		Check the fan, the display and the follow-up where operating temperature < / > 45 ° C.
11		Turn off the follow-up system (**Service only**)
12		Indicate Encoder heading
12.1		Indicate Alignment Error

Serial no.	DIP switch setting	Function
12.2	 1 2 3 4 5 6 7 8	Indicate SEC (Speed Error Correction)
12.3	 1 2 3 4 5 6 7 8	Indicate ship's mains input voltage (24VDC)
12.4	 1 2 3 4 5 6 7 8	Indicate internal operating voltage of network card (14VDC)
12.5	 1 2 3 4 5 6 7 8	Indicate Encoder supply voltage (15VDC)
12.6	 1 2 3 4 5 6 7 8	Indicate inductive DC transmission supply voltage (60VDC)
12.7	 1 2 3 4 5 6 7 8	Indicate internal operating voltage of network card (19VDC)
12.8	 1 2 3 4 5 6 7 8	Indicate present current due to inductive transmission
12.9	 1 2 3 4 5 6 7 8	Indicate operating voltage of heating
12.10	 1 2 3 4 5 6 7 8	Indicate heating voltage at heating element
12.11	 1 2 3 4 5 6 7 8	Indicate temperature of the supporting liquid in °C
12.12	 1 2 3 4 5 6 7 8	Indicate supporting liquid 2.0 – 1.6 = level OK 0.1 – 0.0 = level too low
12.13	 1 2 3 4 5 6 7 8	Indicate operating voltage (73VAC)
12.14	 1 2 3 4 5 6 7 8	Indicate DC operating voltage for 400Hz (78 – 79.5VDC)

Serial no.	DIP switch setting	Function
12.15		Indicate gyro supply 54-56V_{EFF}
12.16		Indicate gyro current 160-250mA_{EFF}
12.17		Indicate operating voltage (11-15VDC)
12.18		Indicate internal operating voltage 15VDC (14.1-15.5VDC)
12.19		Indicate internal operating voltage 24VDC (23-35 VDC)
12.20		Indicate pump voltage 24V 50Hz (24V +/- 1V, 50 Hz)
12.21		Indicate pump current (150mA)
12.22		Indicate pick-up voltage (coded)
12.23		Indicate program number and software version of the program for the microprocessor on the sensor card.
12.24		Indicate program number and software version of the program for the microprocessor on the network card.
12.25		Indicate program number and software version of the program for microprocessor MC 1 on the outer sphere card.
12.26		Indicate program number and software version of the program for microprocessor MC 2 on the outer sphere card
12.27		Operating time (years)

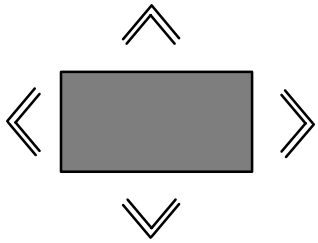
Serial no.	DIP switch setting	Function
12.28		Operating time (hours)
13		Error logbook
		DIP switch settings, Speed Error Correction (SEC) (for development purposes only)

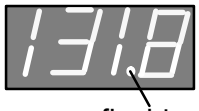
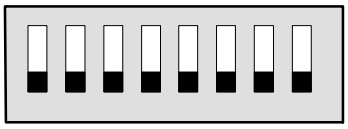
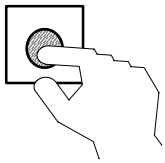
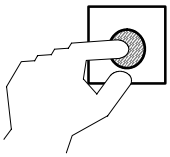
5.1.1 7 segment displays and their meaning



5.1.2 Functional description of DIP switch settings (for general use)

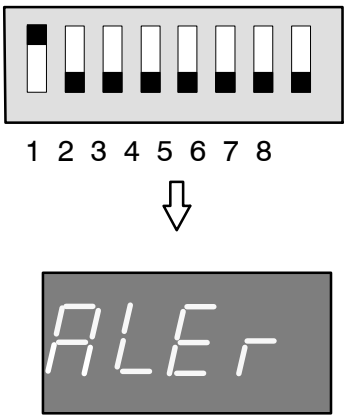
Note: In the following tables, a flashing display on the compass is represented like this.

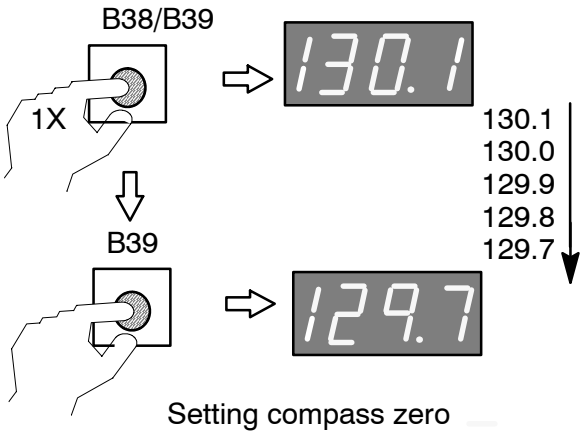


Serial No.	Indications	Comments, Information
1	Normal operation If the decimal point flashes during normal operation, a warning can be displayed by means of the following procedure.	
	 flashing Switch B 37 (DIP switch)  OPEN 1 2 3 4 5 6 7 8	B39  Indicate warning 4 to 8 (if a warning appears, refer to operator manual) B38  Indicate warning 1 to 4 (if a warning appears, refer to operator manual)

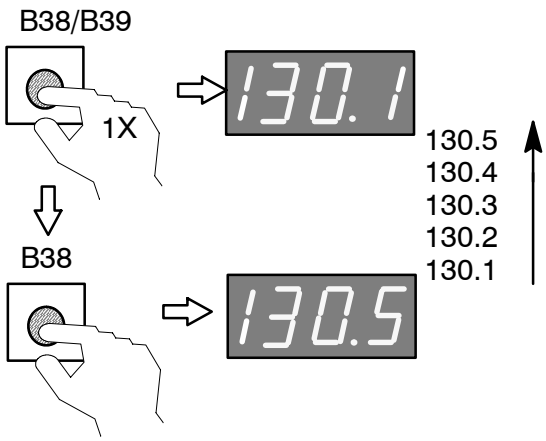
Serial No.	Indications	Comments, Information
2	Setting compass zero The compass zero must be set following installation. Use the pier course from the sea chart as reference.	

Switch B 37 (DIP switch)



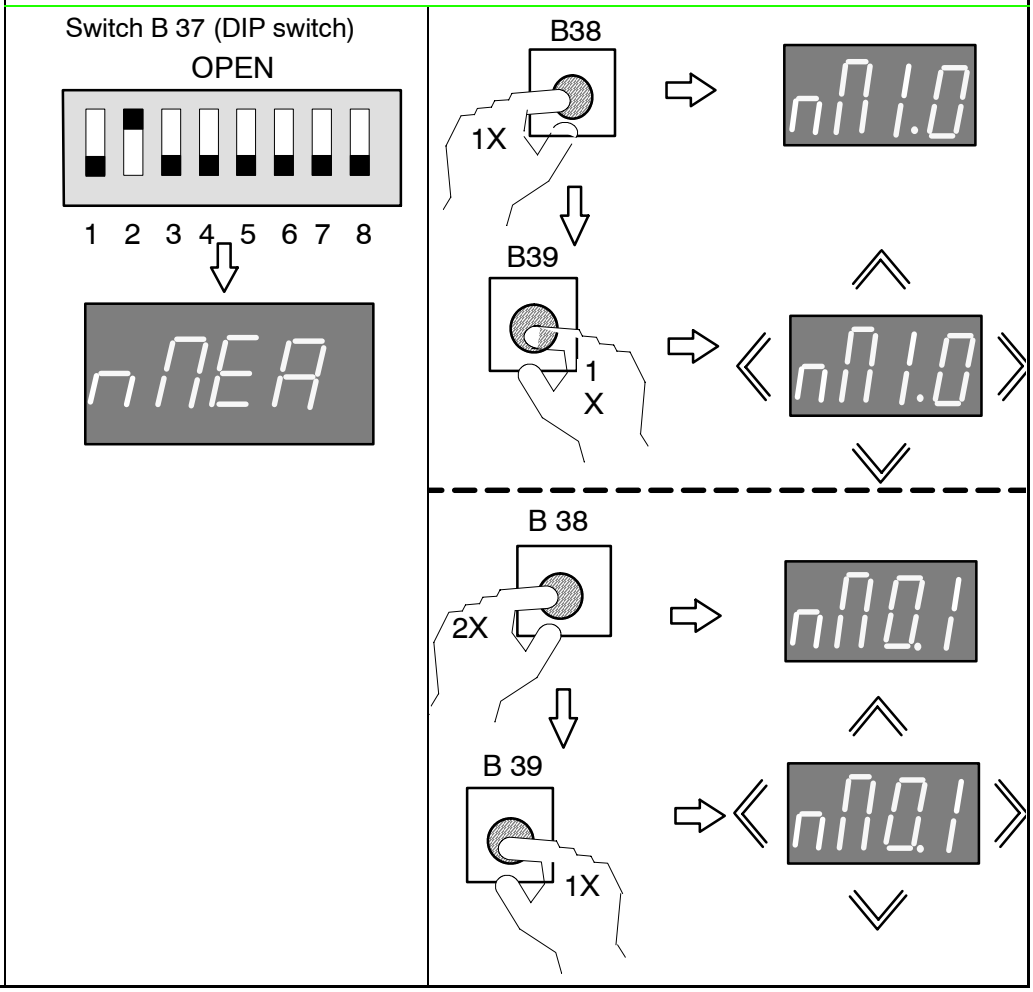


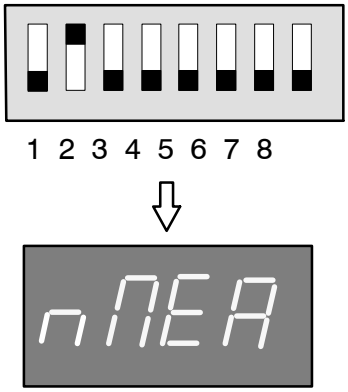
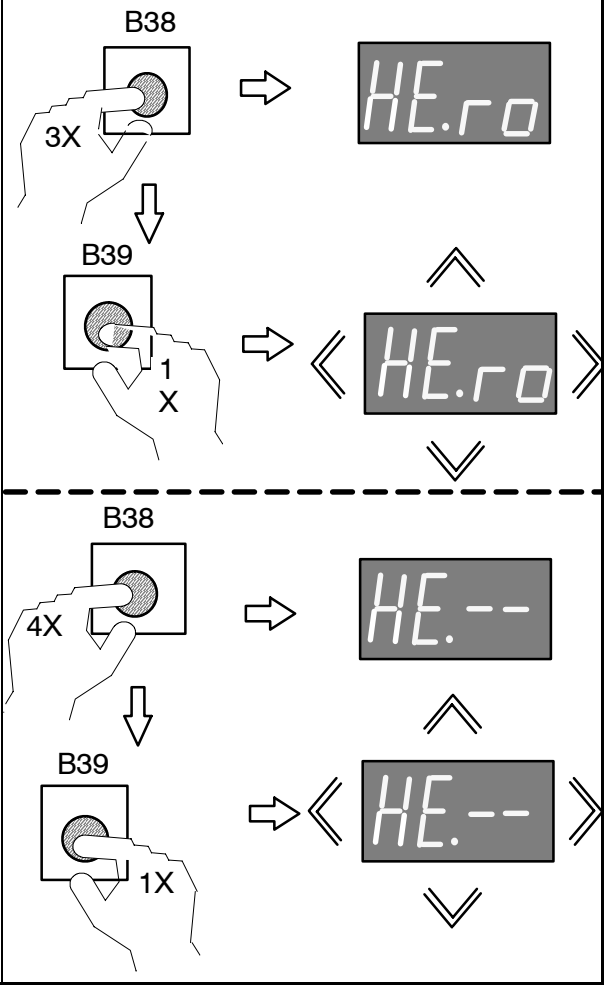
Setting compass zero

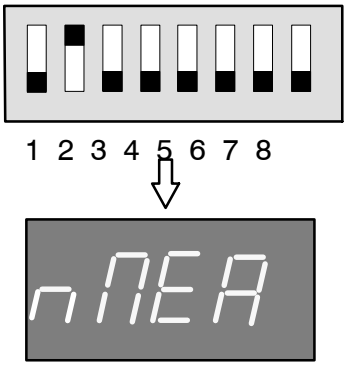
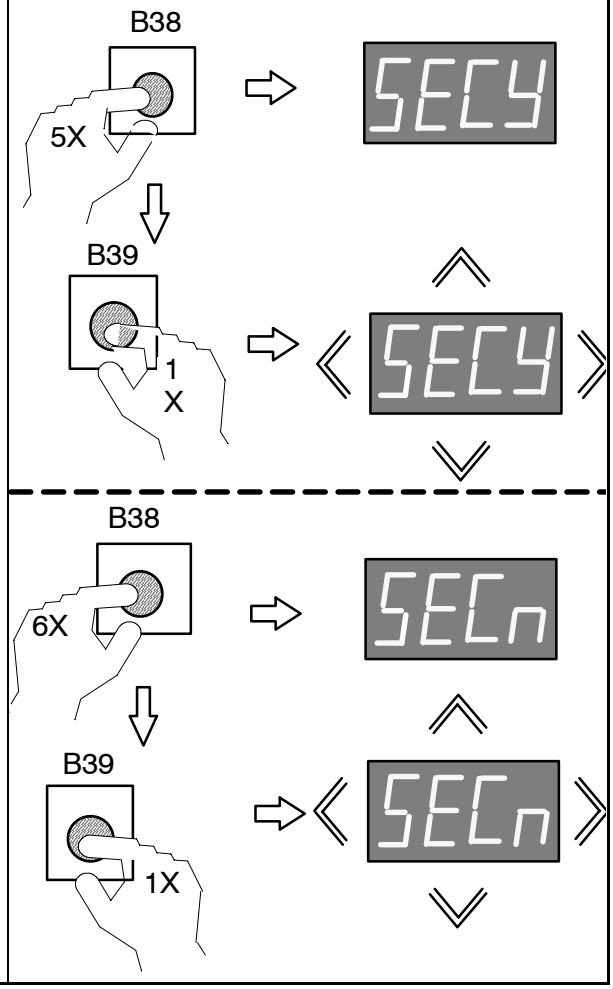


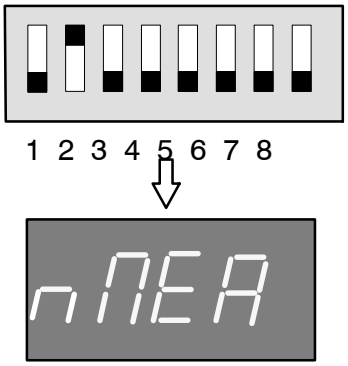
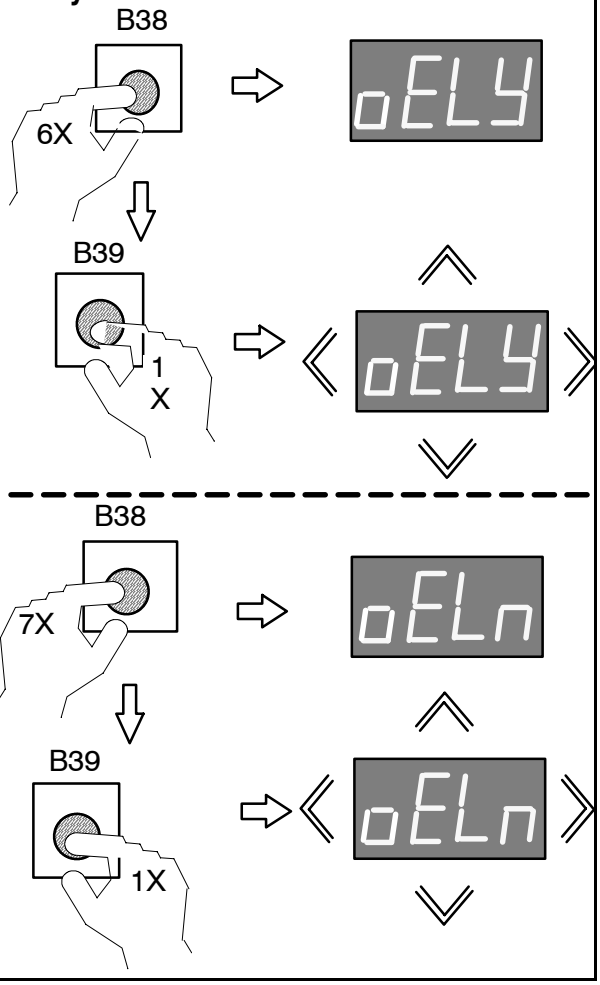
Setting compass zero

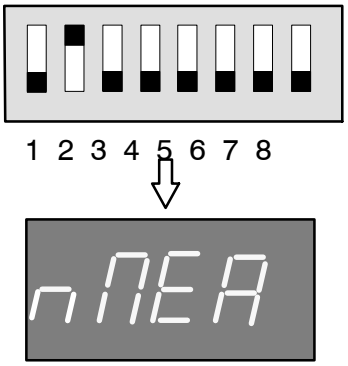
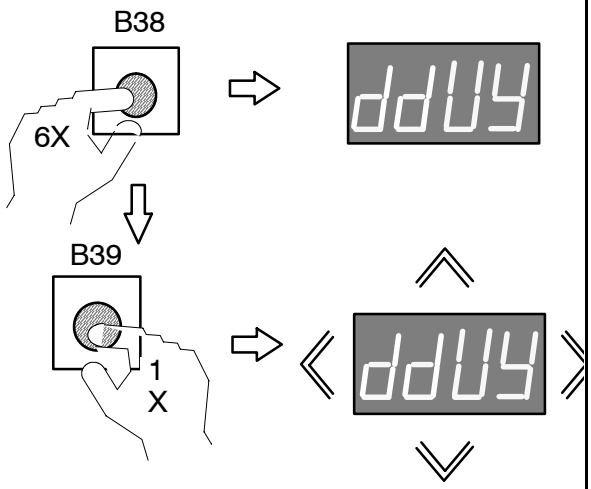
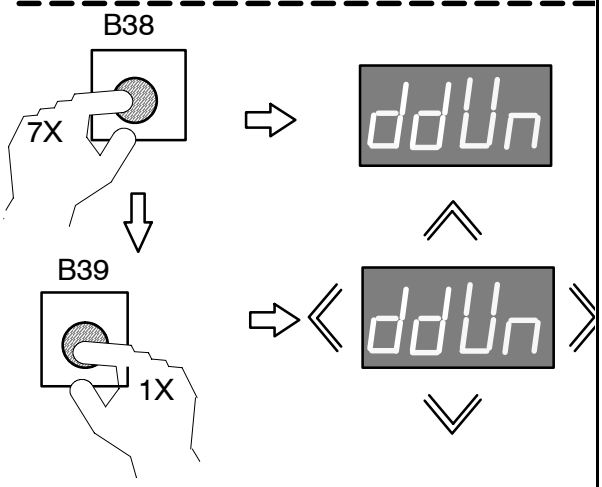
Serial No.	Indications	Comments, Information
3	Set the repetition rate of the NMEA heading data output, the output with or without ROT (Rate of Turn), with or without oil residual error for the speed error correction and the setting of a connected Data Distribution Unit (not for STD 22 Compact Gyro Compass). 1.0 heading data transmission 1 x per second 0.1 heading data transmission 1 x per second HE.ro heading with ROT. HE.-- heading only SECY heading data incorporating Speed Error Correction SECn heading data without Speed Error Correction oELY Speed Error Correction with oil residual error (recommended setting) oELn Speed Error Correction without oil residual error ddUY with connected Data Distribution Unit ddUn without Data Distribution Unit (setting for STD 22 Compact Gyro Compass absolute necessary) The indications in the flashing display are selected.	

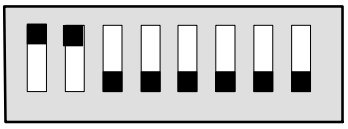
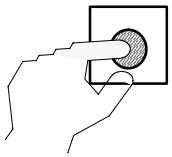
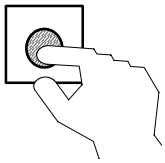


Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  	

Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  	

Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  	**With Speed Error Correction has to be set always to oELY** 

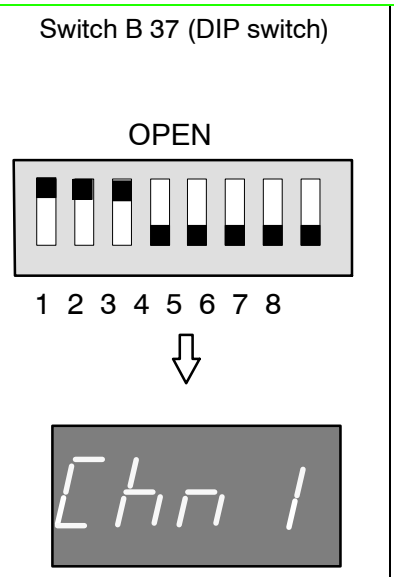
Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  	**Has always be set to ddUY in case of STD 22 Gyro Compass**   **Has always be set to ddUn in case of STD 22 Compact Gyro Compass**

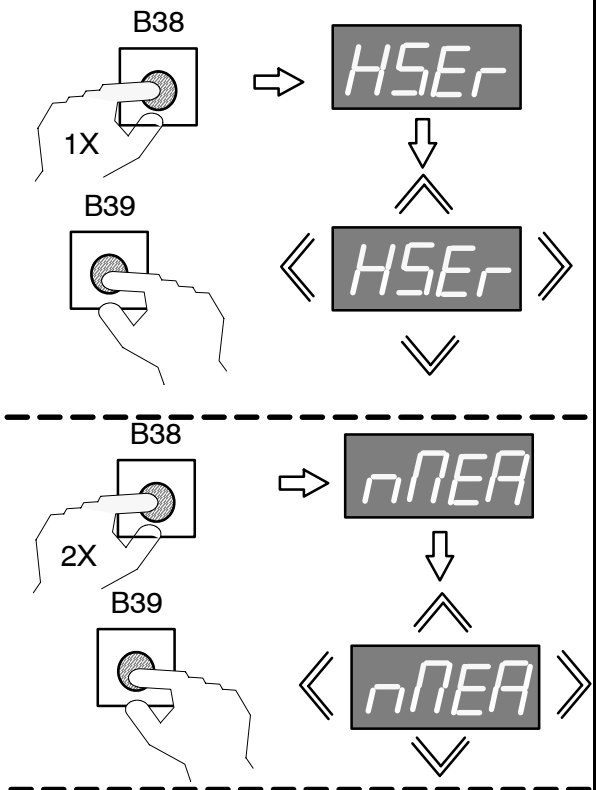
Serial No.	Indications	Comments, Information
4	Set the CAN bus address of the compass **For STD 22 Gyro Compass only** (only with Distribution Unit, Operation Unit and for further CAN bus users) Every CAN bus user has an address. This address may be assigned within the system only once. The CAN bus address for compasses can be set within a range from 10 to 19 (se table below). The address 00 may not be used.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 	B38  each time pressed changes downwards B39  each time pressed changes upwards

Example

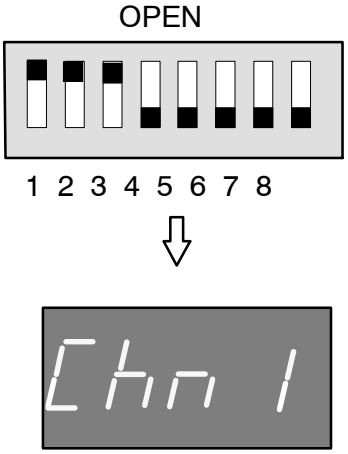
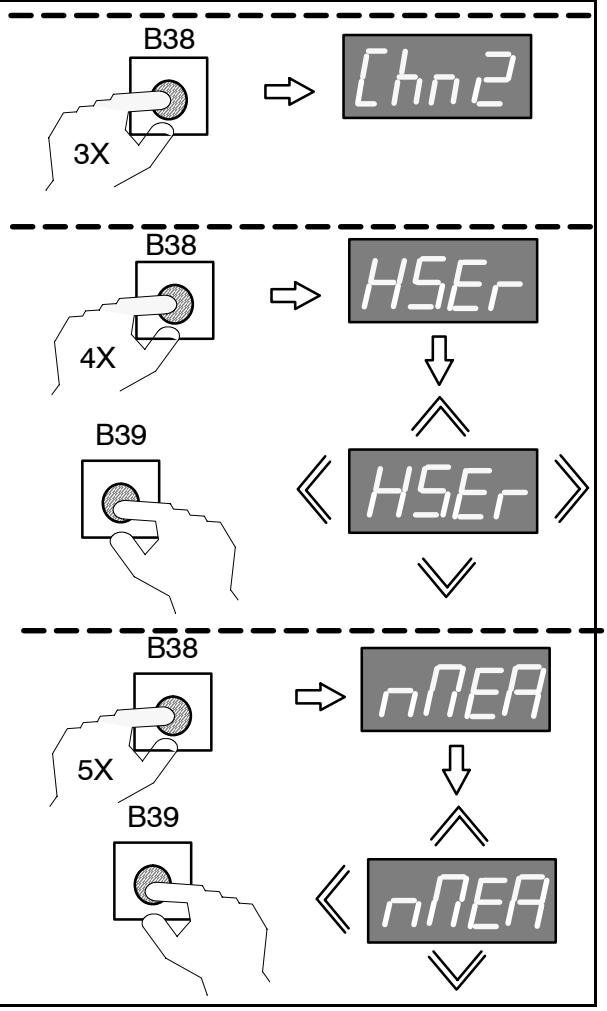
	Devices	CAN bus address
1	Operator Units	01 to 09
2	Sensors (STD 22, GPS compass etc.)	10 to 19
3	Distribution Units	20 to 29
4	Repeater compasses	30 to ...

Serial No.	Indications	Comments, Information
5	Set the interfaces for Channel 1 and Channel 2. **For STD 22 Compact Compass only** HSEr = Heading serial (Course bus) nMEA = NMEA 0183 The “flashing” setting is accepted.	

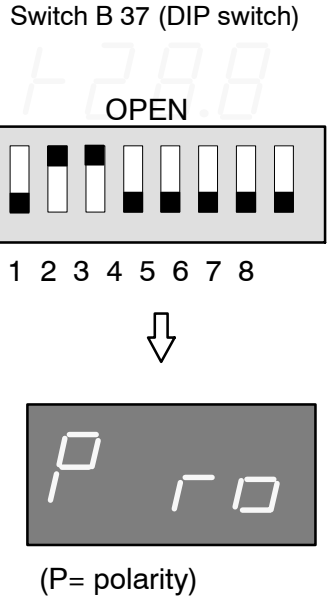


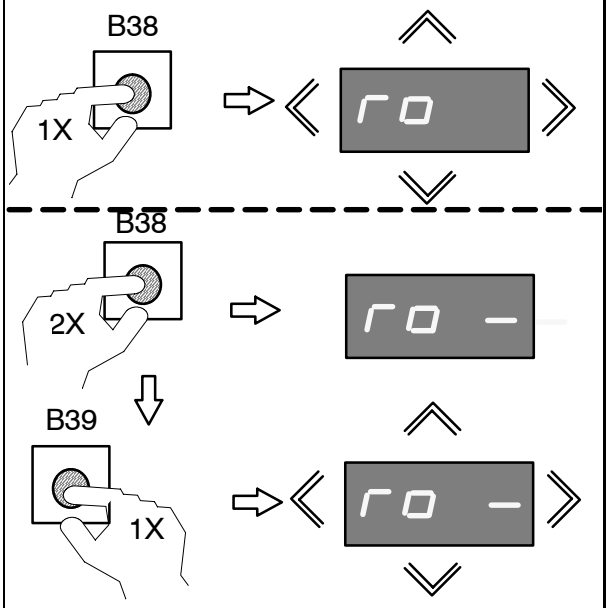


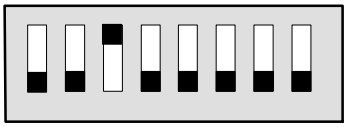
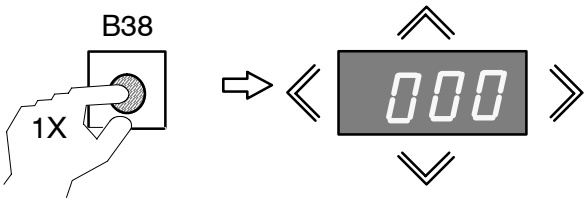
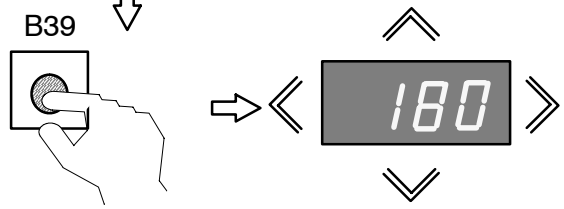
continued on next page

Serial No.	Indications	Comments, Information
cont. No. 5	Switch B 37 (DIP switch) 	

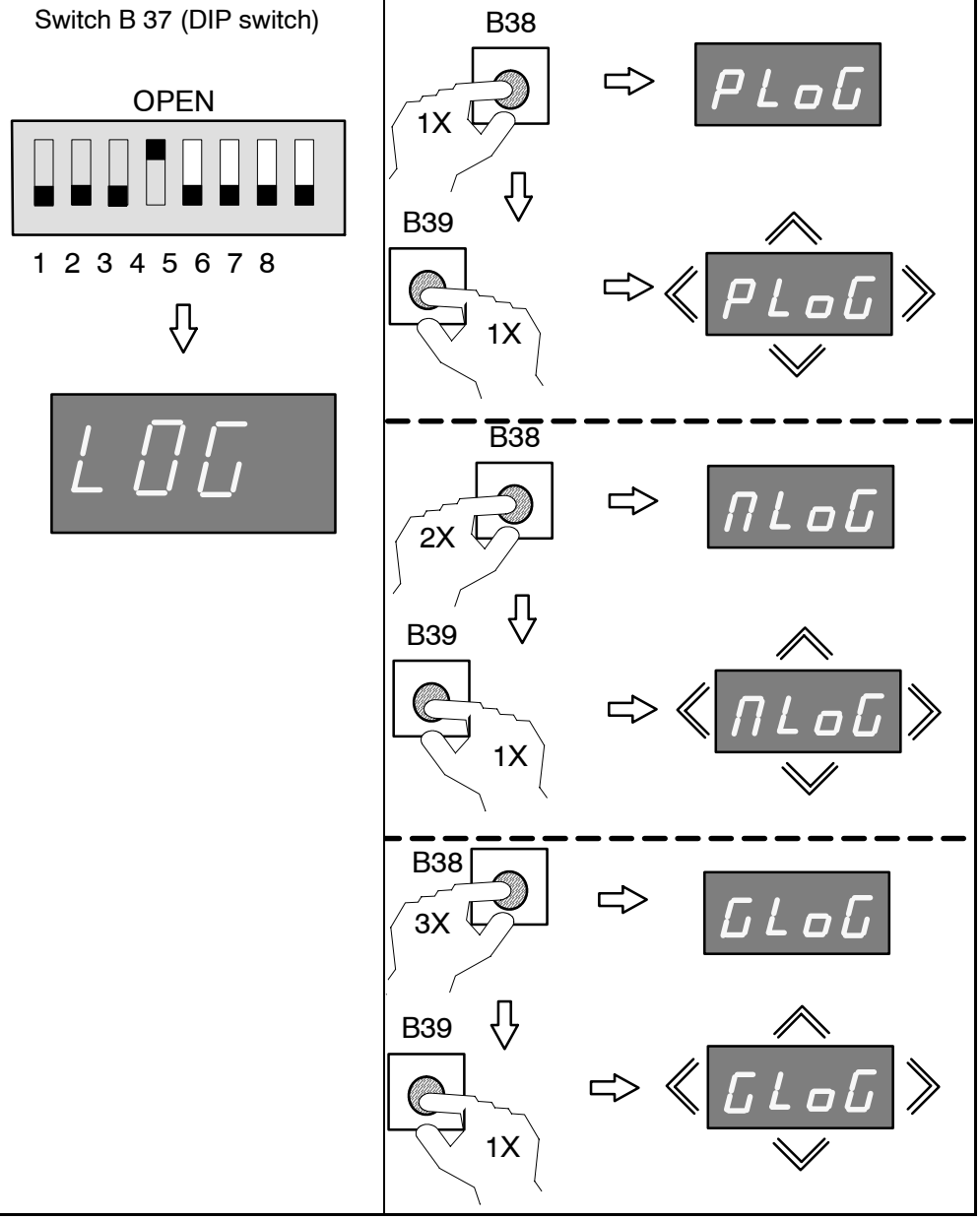
Serial No.	Indications	Comments, Information
6	Set the polarity of ROT turning direction This information is supplied together with the course data to connected course receivers. Press button B38 to toggle between the two possible polarities. Press button B39 to select the polarity of the rate of turn. The indications in the flashing display are selected. A positive rate of turn is indicated by the absence of a minus sign.	

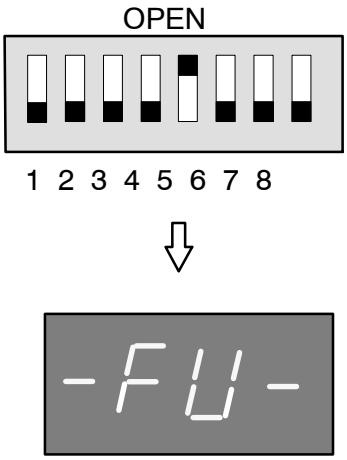
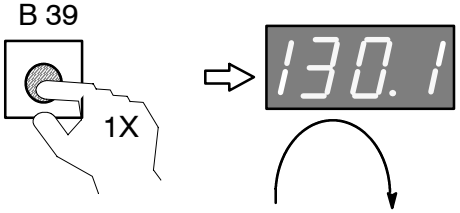
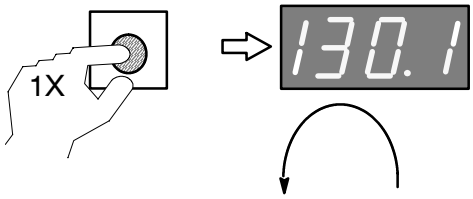
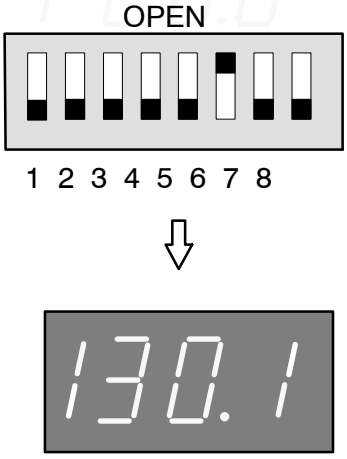
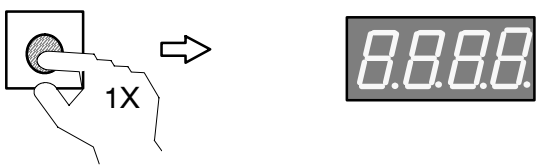


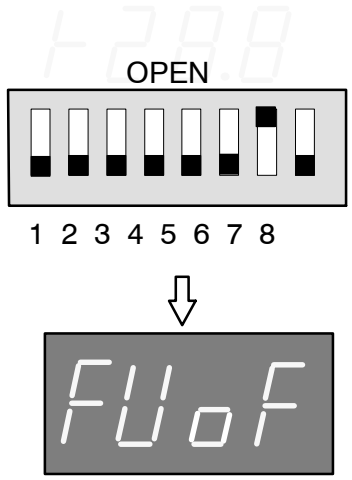
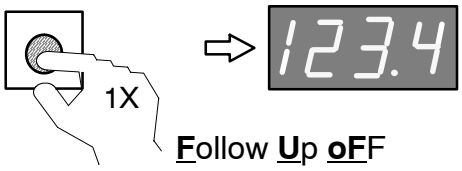
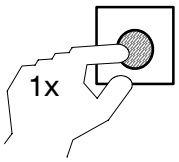


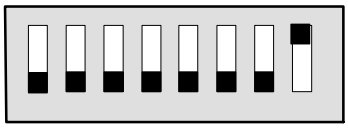
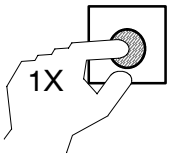
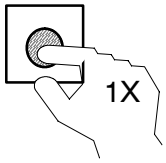
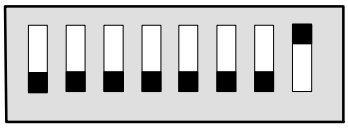
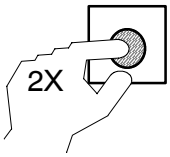
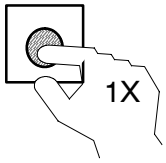
Serial No.	Indications	Comments, Information
7	Bridging over settling time **CAUTION! When the settling in stage is by-passed, the display and all connected course receivers indicate that the course data is usable, even though there may be significant deviations.** **FOR SERVICE PURPOSES ONLY**	
	Switch B 37 (DIP switch) OPEN  Example: 	B38  B39  After the DIP switch is set into zero position the settling stage is by-passed

Serial No.	Indications	Comments, Information
8	Set the speed source for SEC **(STD22 Compact only)** This setting is used to select the source of the speed information for automatic Speed Error Correction. PLoG = pulse log NLoG = NMEA log GLoG = GPS speed The indications in the flashing display are selected. If the setting does not correspond to the connected device, the course correction relay responds and gives an appropriate warning only to devices which are connected to this alarm output.	

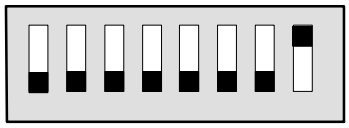


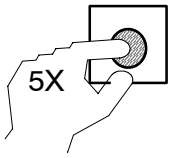
Serial No.	Indications	Comments, Information
9	Check connected course receivers (course data) (not implemented at the present time)	
	Switch B 37 (DIP switch) 	B 39  B38 
10	Check the fan, the display and the follow-up, where the operating temperature is < / > 45 ° C. **<u>The current course is displayed on the connected course receivers.</u>**	
	Switch B 37 (DIP switch) 	B39 

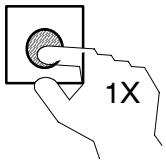
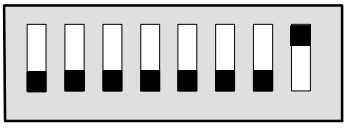
Serial No.	Indications	Comments, Information
11	Turn off the follow-up system **(SERVICE ONLY)** These switches turn off the follow-up system of the compass, in other words, the display no longer follows the course. Caution: The displayed course and the course for all connected course receivers do not correspond to the ship's course.	
	Switch B 37 (DIP switch)  	B38  **F**ollow **U**p **oF**F Follow-up system turned off B39  The displayed value is exclusively for development purposes.

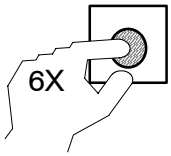
Serial No.	Indications	Comments, Information
12	Indicate Encoder heading	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ G4ro	B38  1X ⇨ Enco ⇩ B39  1X ⇨ 130.1
12.1	Indicate Alignment Error	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ G4ro	B38  2X ⇨ ALEr ⇩ B39  1X ⇨ 000.0 Indicating the current Alignment Error

Serial No.	Indications	Comments, Information
12.2	Indicate SEC (Speed Error Correction) value The heading indication already takes this value into account.	
	Switch B 37 (DIP switch) OPEN 1 2 3 4 5 6 7 8

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.4</td><td colspan="2">Indicate: Internal operating voltage of power PCB
Nominal value 14VDC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8

 </td><td>B38
 

B39
 
 </td></tr>
<tr><td>12.5</td><td colspan="2">Indicate: Encoder supply voltage
Nominal value 15VDC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8

 </td><td>B38
 

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 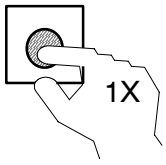
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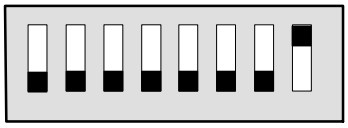
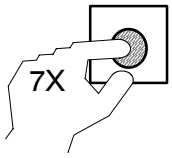
<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.6</td><td colspan="2">Indicate: Inductive DC transmission supply voltage
Nominal value: 60VDC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8

 </td><td>B38
 

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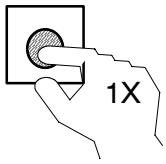
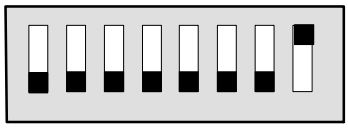
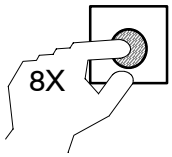
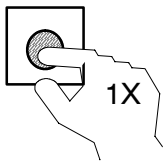
 
 </td></tr>
<tr><td>12.7</td><td colspan="2">Internal operating voltage of network card
Nominal value 19VDC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8

 </td><td>B38
 

B39
 
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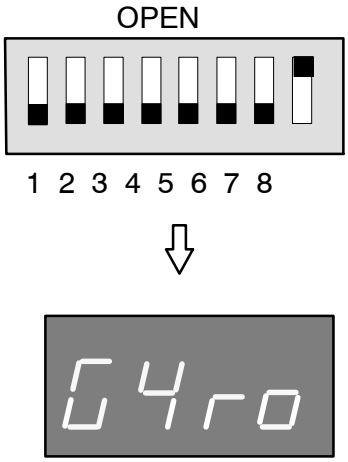
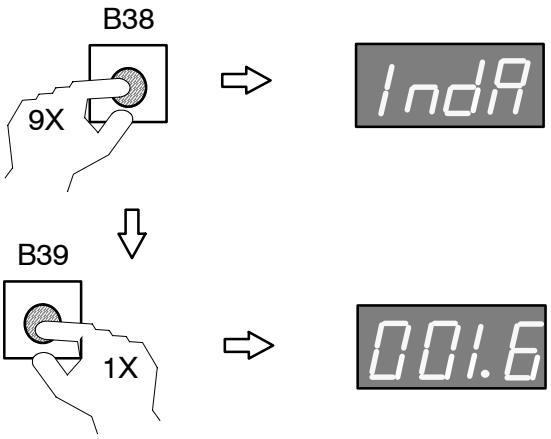
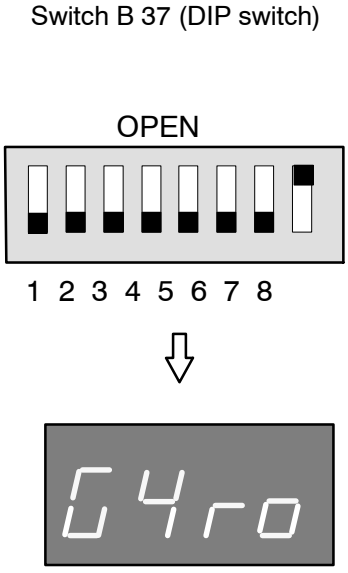
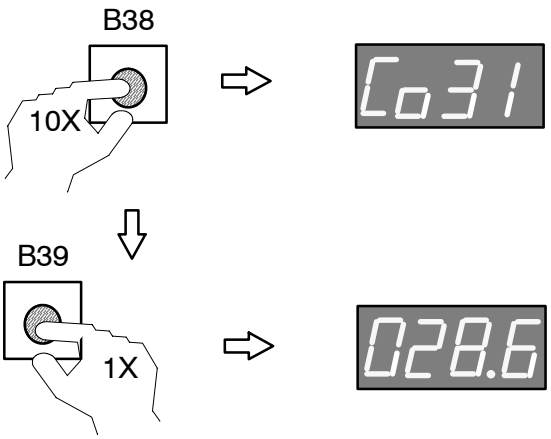
<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.8</td><td colspan="2">Indicate: Operating current (inductive transmission)
<u>(for development purposes only)</u></td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
<tr><td>12.9</td><td colspan="2">Indicate: operating voltage of heating
(nominal value: 27 ... 32VDC)</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
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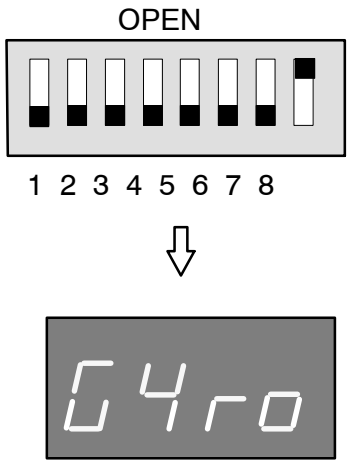
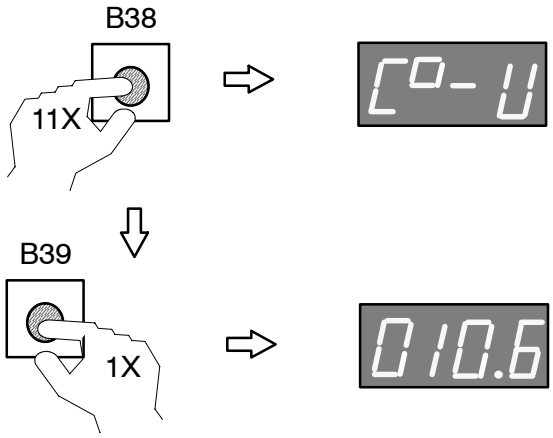
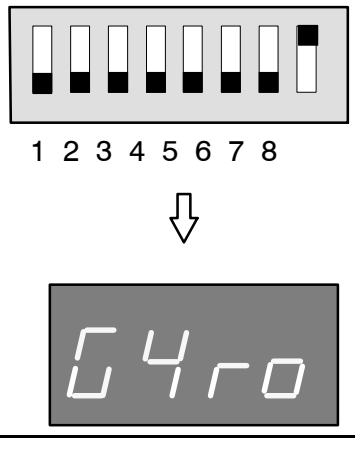
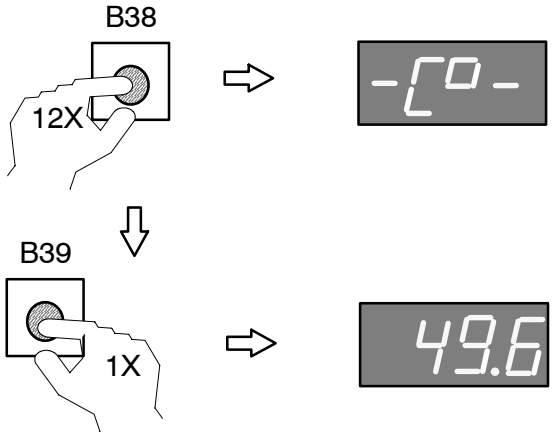
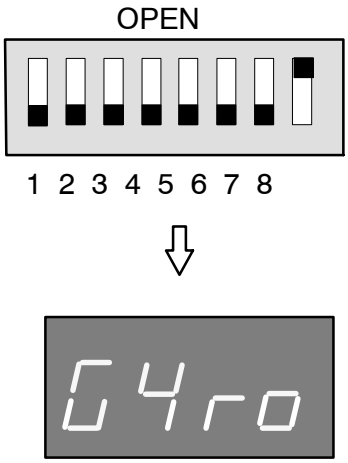
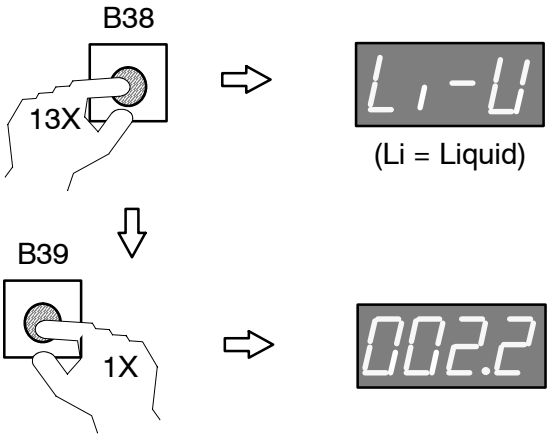
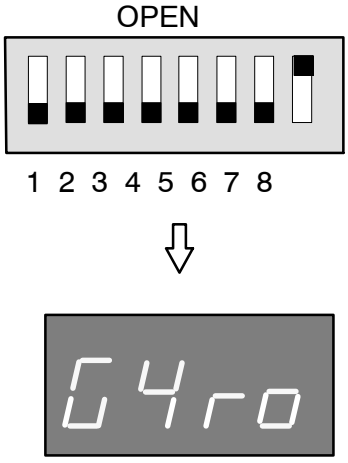
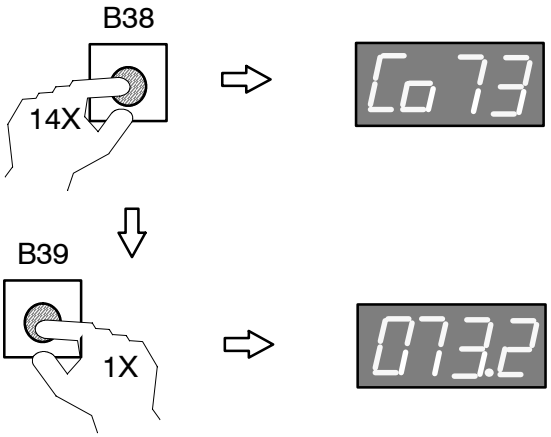
Serial No.	Indications	Comments, Information
12.10	Heating voltage at heating element Nominal value: 0 .... 23.5VDC	
	Switch B 37 (DIP switch) 	
12.11	Indicate temperature of the supporting liquid in °C Nominal value: 48°C to 51°C	
	Switch B 37 (DIP switch) 	

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.12</td><td colspan="2">Indicate supporting liquid level
Indication “2.2” = liquid level OK
Indication “0” = liquid level not OK</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
<tr><td>12.13</td><td colspan="2">Indicate operating voltage
Nominal value: 70...75VAC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
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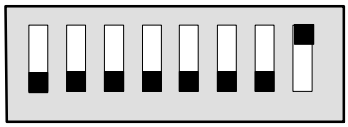
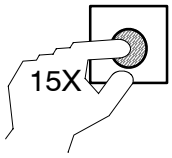
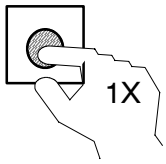
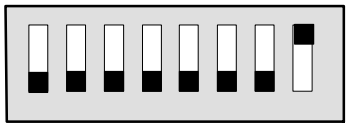
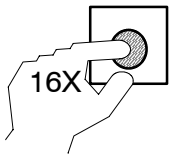
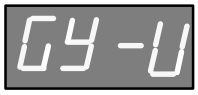
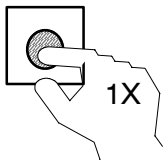
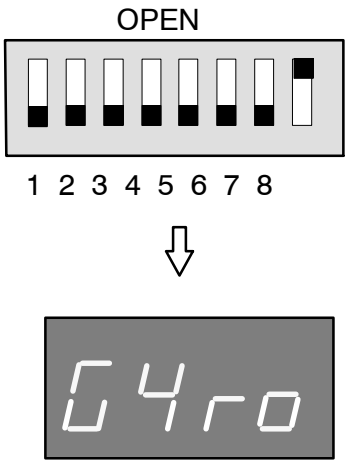
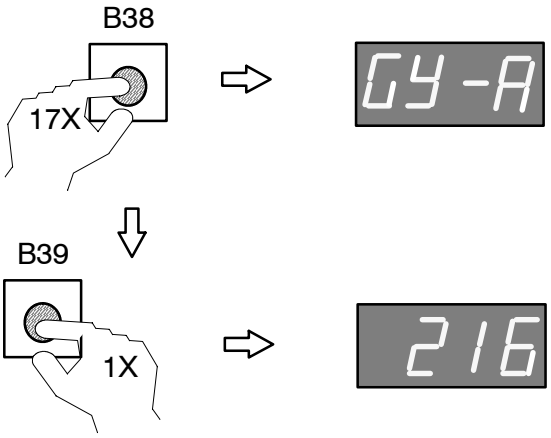
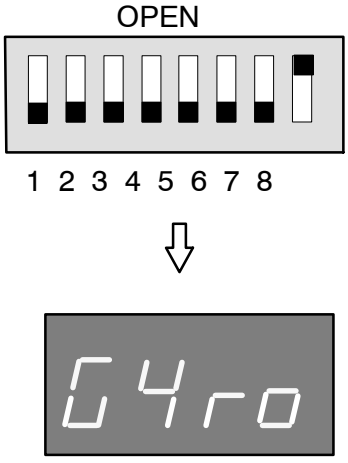
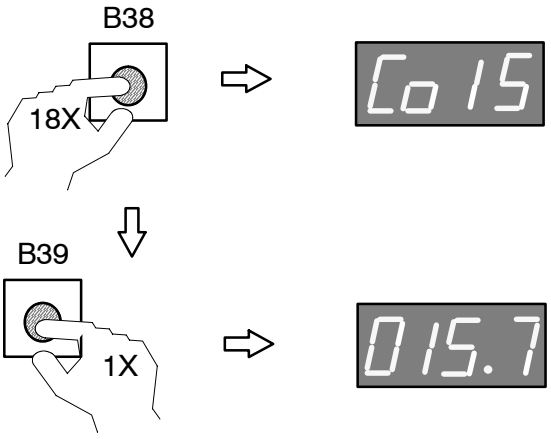
Serial No.	Indications	Comments, Information
12.14	Indicate DC operating voltage for 400Hz Nominal value: 78 ... 79.5VDC	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 	B38  B39 
12.15	Indicate gyro supply Nominal value 55VAC (400Hz)	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 	B38   B39 

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.16</td><td colspan="2">Indicate gyro current in mA
Nominal value: 180 .... 250mA$_{EFF}$</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
<tr><td>12.17</td><td colspan="2">Indicate operating voltage 15VDC
Nominal value: 11...15VDC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
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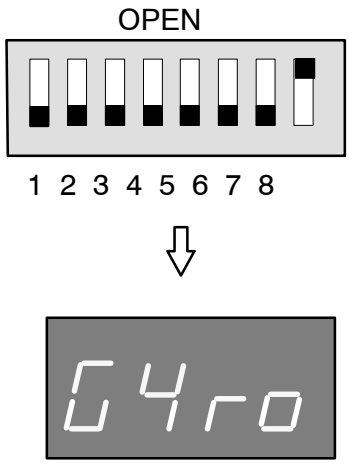
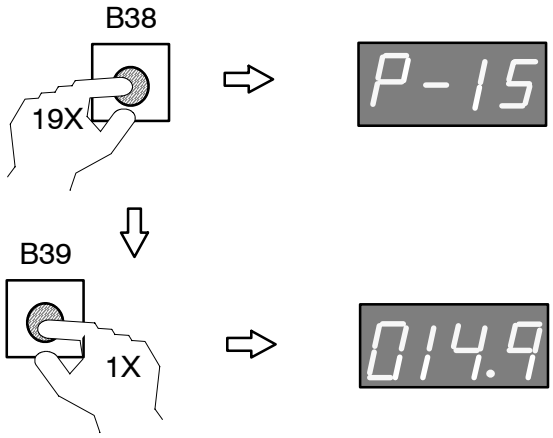
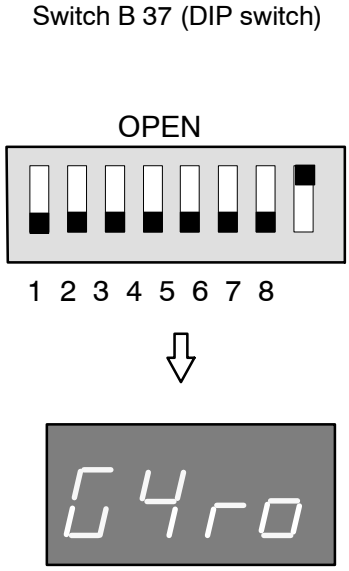
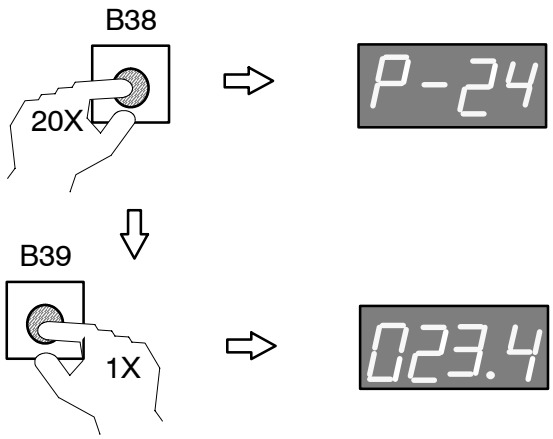
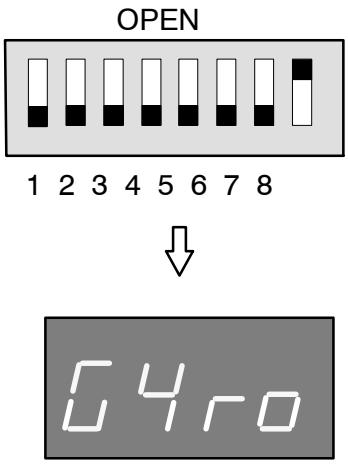
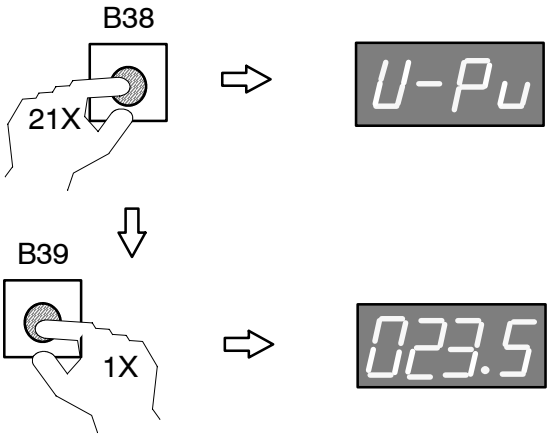
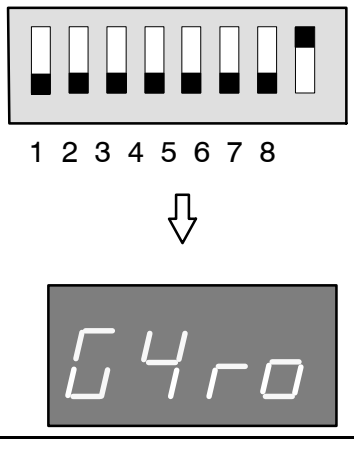
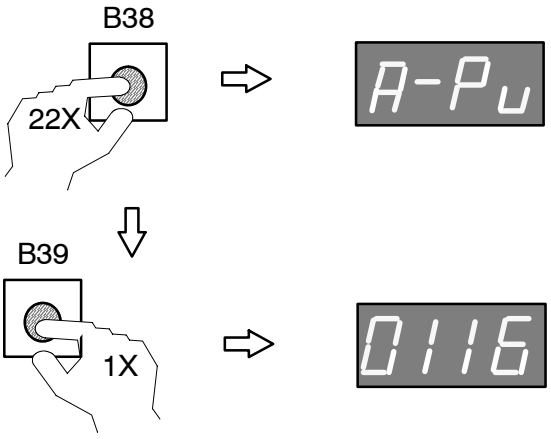
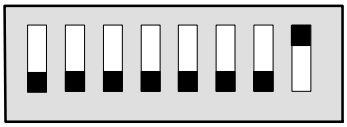
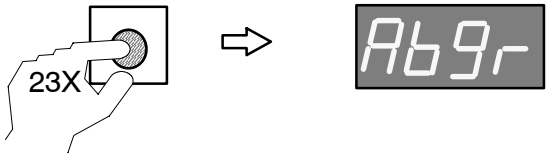
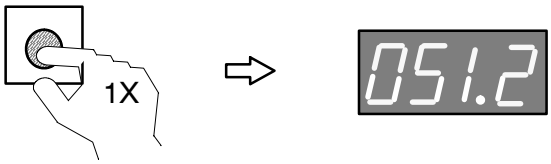
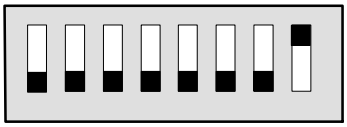
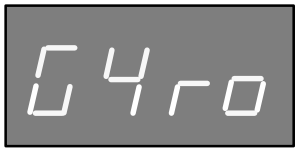
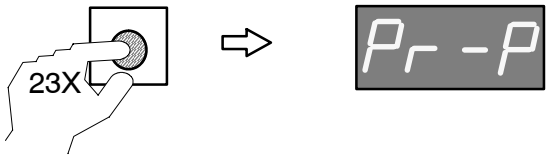
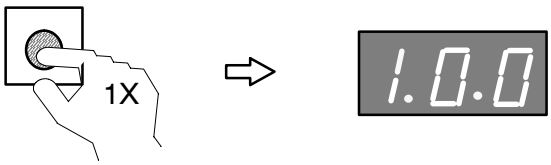
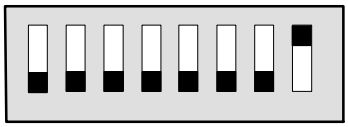
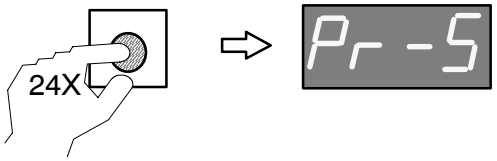
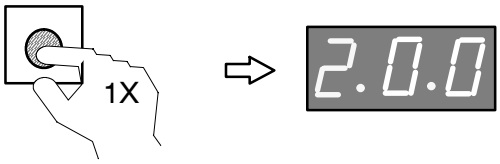
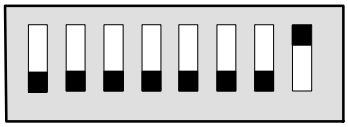
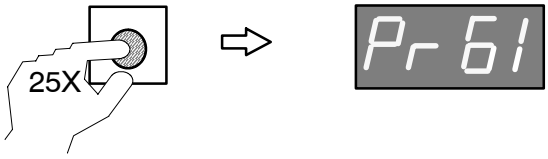
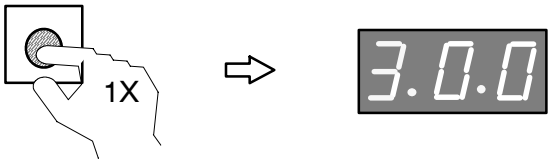
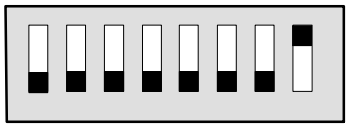
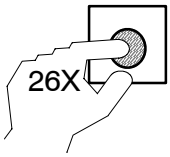
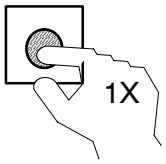
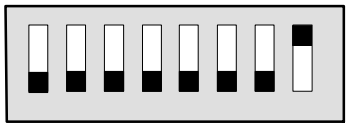
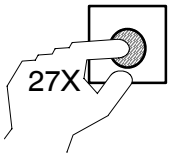
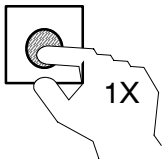
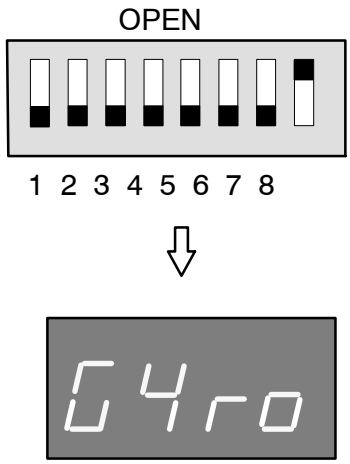
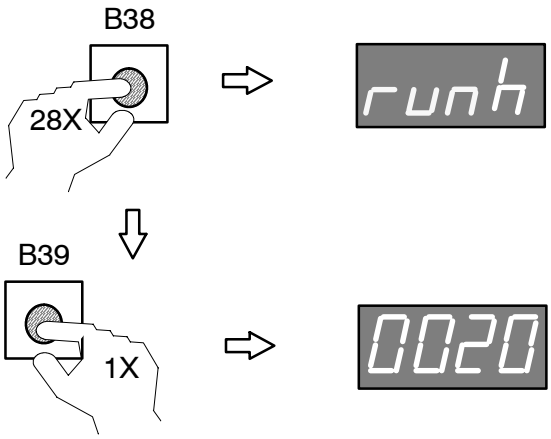
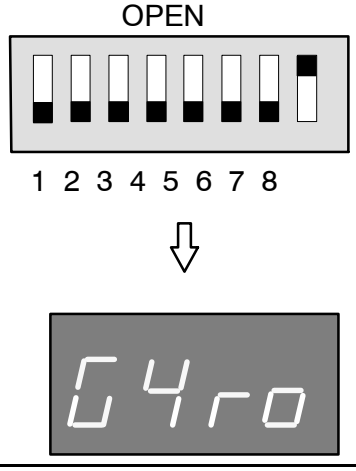
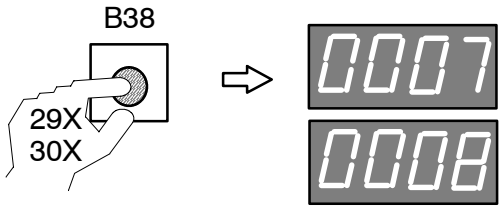
Serial No.	Indications	Comments, Information
12.18	Indicate internal operating voltage 15VDC Nominal value: 14.1...15.5VDC	
	Switch B 37 (DIP switch) 	
12.19	Indicate internal operating voltage 24VDC Nominal value: 22...25VDC	
	Switch B 37 (DIP switch) 	

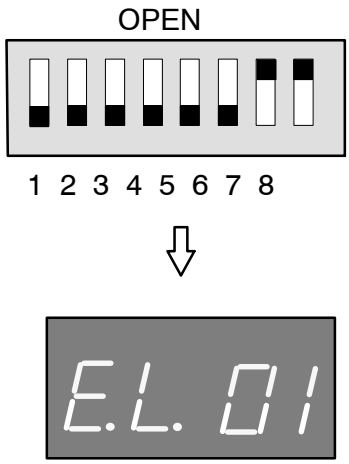
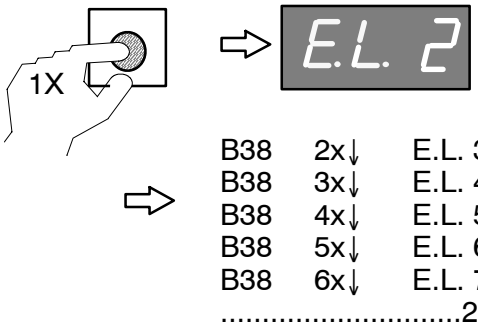
<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.20</td><td colspan="2">Indicate pump voltage 24V 50Hz
Nominal value: 24VAC +/- 1V</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
<tr><td>12.21</td><td colspan="2">Indicate pump current
Indicate in mA/AC, nominal value: 150mA +/- 20mA</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
</table>

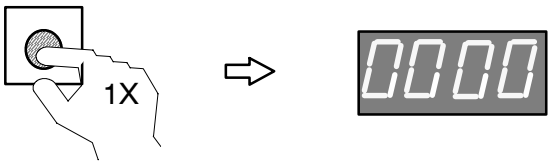
Serial No.	Indications	Comments, Information
12.22	Indicate tap voltage (direct encoder voltage) Balancing voltage indication: approx. 512	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ Gyro	B38  23X Abgr ⇩ B39  1X 051.2 Button B39 hold down: display in degree Button B39 released again: display in a coded value (appr. 182 per degree)
12.23	Indicate program number and software version of the program for the microprocessor on the sensor card.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩  Gyro	B38  23X Pr-P ⇩ B39  1X 1.0.0

Serial No.	Indications	Comments, Information
12.24	Indicate program number and software version of the program for the microprocessor on the network card.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ 	B38  B39 
12.25	Indicate program number and software version of the program for microprocessor MC 1 on the outer sphere card.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ 	B38  B39 

Serial No.	Indications	Comments, Information
12.26	Indicate program number and software version of the program for microprocessor MC 2 on the outer sphere card.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 	B38  B39 
12.27	Operating hours meter (years)	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 	B38  B39 

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.28</td><td colspan="2">Operating hours meter (hours)</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
<tr><td>12.29
12.30</td><td colspan="2">In F7
In F8
Both functions are for future purpose</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td> 
</td></tr>
</table>

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>13</td><td colspan="2">Error logbook.
Indication of errors and warnings, stating the frequency of occurrence.</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 
</td><td>B38
 

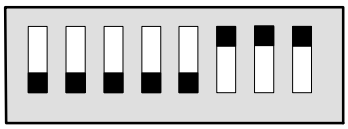
B38 2x↓ E.L. 3
B38 3x↓ E.L. 4
B38 4x↓ E.L. 5
B38 5x↓ E.L. 6
B38 6x↓ E.L. 7
.....24
Number of errors/warnings occurring
B39
 
</td></tr>
<tr><td colspan="3">To delete error logbook: press button B39 for approximately 10 seconds.
the actual indicated line is deleted.</td></tr>
</table>

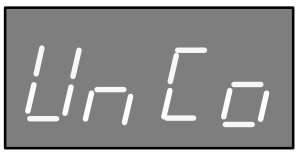
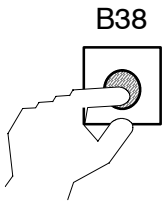
Information concerning the error logbook (see also section 7.1):

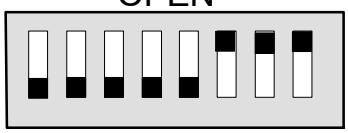
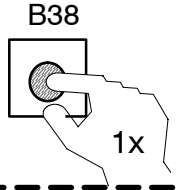
Error-log	Comment	Error group	Dis-play
E.L.01	Serial connection of sensor card to network card faulty	PCbP	Er.01
E.L.02	Inductive transmission faulty	PCbP	Er.02
E.L.03	System voltage (B5.5 ⇒ B5.8) on network card faulty	PCbP	Er.03
E.L.04	Encoder voltage faulty	PCbP	Er.04
E.L.05	System voltage (B5.1 ⇒ B5.4) on network card faulty	PCbP	Er.05
E.L.06	Encoder faulty	PCbS	Er.01
E.L.07	CAN dialogue from gyro card to sensor card faulty	PCbS	Er.02
E.L.08	Follow-up system faulty	PCbS	Er.03
E.L.09	CAN1 and CAN2 operating voltage faulty	PCbC	Er.01
E.L.10	Supporting liquid error	PCbG	Er.01
E.L.11	System voltage (B21.5 ⇒ B21.8) on gyro card faulty	PCbG	Er.02
E.L.12	Operating voltage 24V faulty	PCbG	Er.03
E.L.13	Operating voltage 15V faulty	PCbG	Er.04
E.L.14	Heating operating voltage (B21.1 ⇒ B21.4) faulty	PCbG	Er.05
E.L.15	Operating voltage 72V faulty	PCbG	Er.06
E.L.16	Operating voltage 78V faulty for 400 Hz	PCbG	Er.07
E.L.17	Gyro supply $55V_{eff}$ faulty	PCbG	Er.08
E.L.18	Gyro current faulty	PCbG	Er.09
E.L.19	Pump voltage faulty	PCbG	Er.10
E.L.20	Pump current faulty	PCbG	Er.11
E.L.21	Temperature sensor faulty	PCbG	Er.12
E.L.22	Serial interface MC1 to MC2 faulty	PCbG	Er.13
E.L.23	CAN interface from sensor card to gyro card faulty	PCbG	Er.14
E.L.24	Heating system faulty	PCbG	Er.15

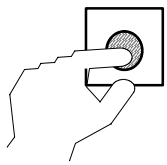
5.1.3 Functional description of DIP switch settings (SEC)

All data stated below should be selected and read out for servicing purposes only.
In standard operation the following data has no significance.

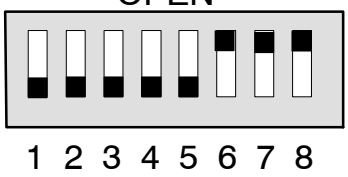
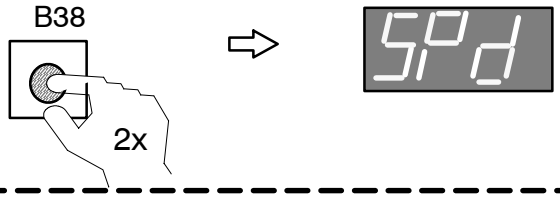
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>1</td><td colspan="2">UnCo = (Uncorrected Compass) = course without speed error correction value.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8

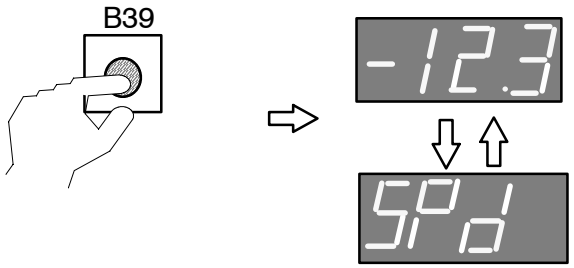
  </td><td>Displays the uncorrected gyro course.
 
B38

Identical with Seq.no. 6</td></tr>
<tr><td>2</td><td colspan="2">FF = FahrtFehler (Speed error) = the value by which the compass course is to be corrected (result from SEC), displayed in degrees, display value approx. max. 10° (see also number 3).</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B38
 
1x

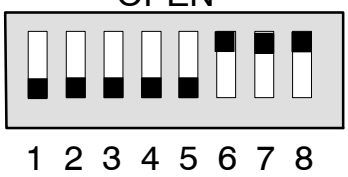
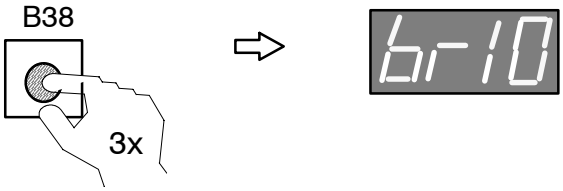
B39
 

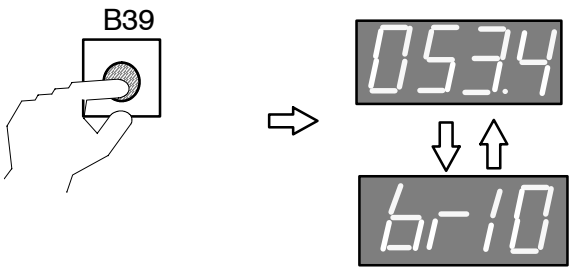
The automatic Speed Error Correction function is defective. Speed or/and position faulty.
 </td></tr>
</table>

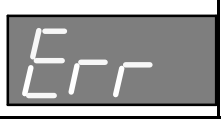
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>3</td><td colspan="2">SPd = Speed = Ship's speed. This speed is provided from the connected and selected log.
(see also number 5).
Displayed in knots, astern sped (- knots) is also possible.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

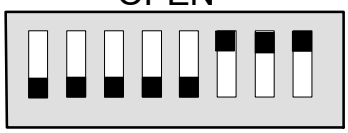
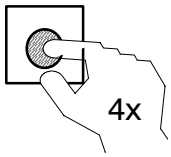
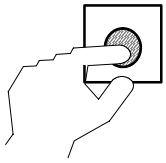
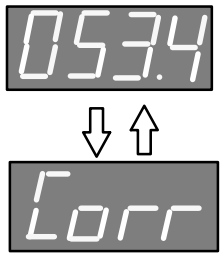
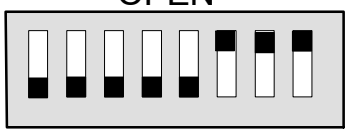
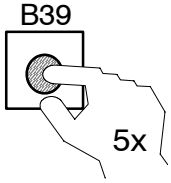
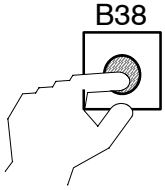
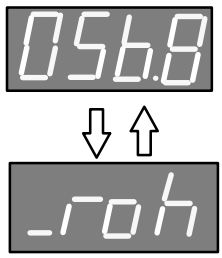
 

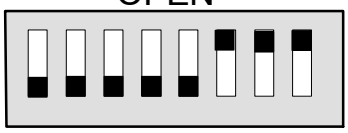
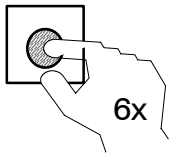
Connected log not providing any speed data.

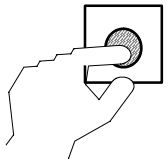
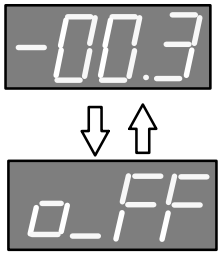
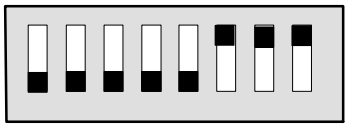
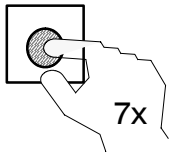
</td></tr>
<tr><td>4</td><td colspan="2">br 10 = Latitude (Breite) at a resolution of $^{1}/_{10°}$.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

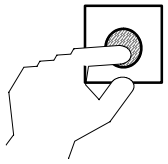
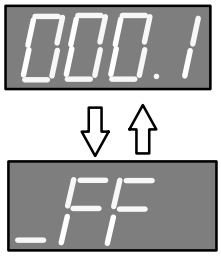
 

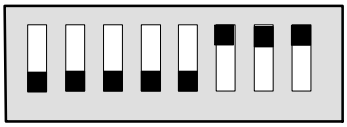
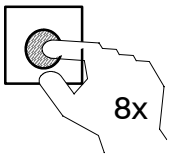
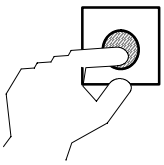
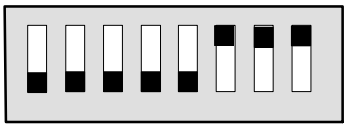
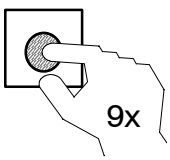
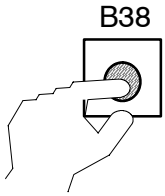
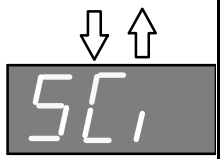
No latitude data available (GPS defective).
 
</td></tr>
</table>

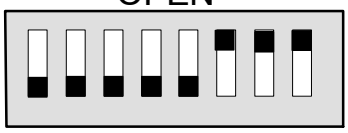
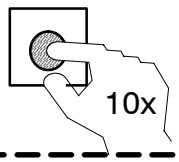
Seq. no.	Indications	Comments, Notes
5	Corr = Corrected course (course taking SEC into account).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B38  B39   The automatic Speed Error Correction function is defective. Speed or/and position faulty.
6	_roh = Rough course (course without SEC).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  B38   Identical with Seq.no. 1

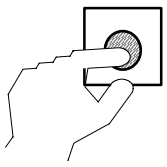
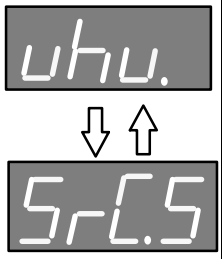
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>7</td><td colspan="2">o_FF = Speed Error (FahrtFehler) + acceleration error.
Indicated in degrees.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
6x

B38
 
 
The automatic Speed Error Correction function is defective. Speed or/and position faulty.
 </td></tr>
<tr><td>8</td><td colspan="2">_FF = Speed Error (FahrtFehler) without acceleration error.
Indicated in degrees.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B38
 
7x

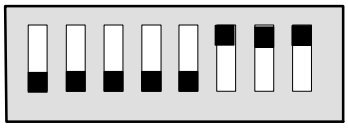
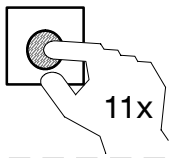
B39
 
 
The automatic Speed Error Correction function is defective. Speed or/and position faulty.
 </td></tr>
</table>

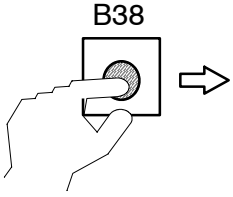
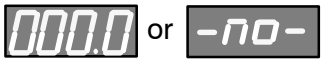
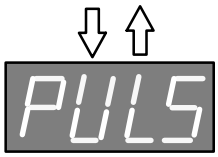
Seq. no.	Indications	Comments, Notes
9	_oF = Acceleration Error (Oelrestfehler) (no speed error components).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  8x B38  The automatic Speed Error Correction function is defective. Speed or/and position faulty.
10	Sci = Serial Interface (Schnittstelle), telegram traffic on serial interface.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  9x Contents alternate B38   Digit 2: NMEA interface (Speed in) Digit 1: GPS interface Digit 0: Sum of all telegrams on both interfaces

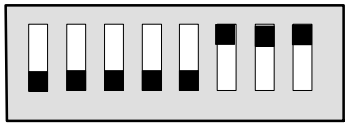
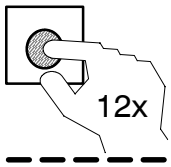
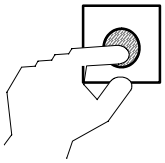
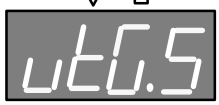
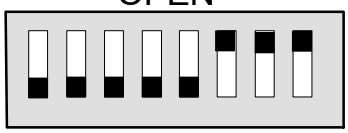
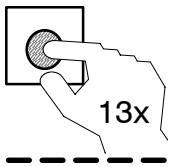
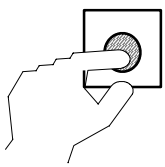
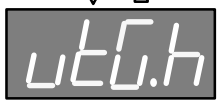
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>11</td><td colspan="2">SrC.S = Source Speed Information.
Data about the source providing the speed value.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
10x

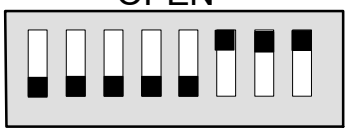
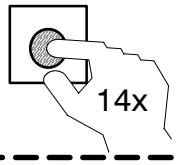
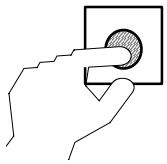
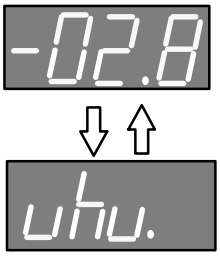
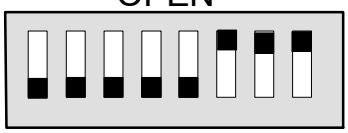
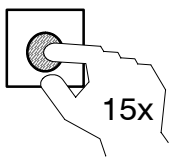
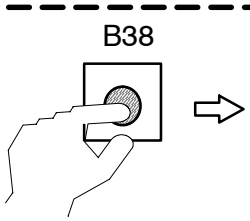
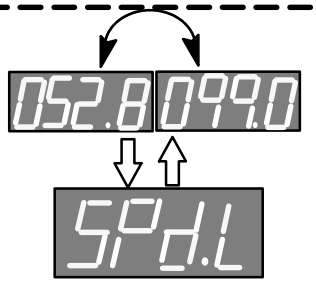
B38
 
 
Display options:

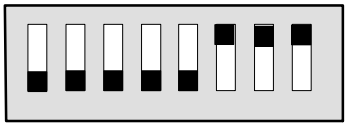
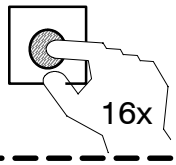
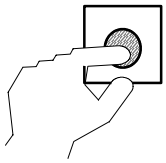
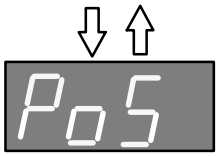
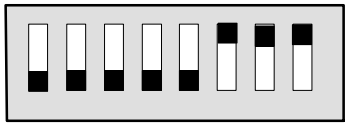
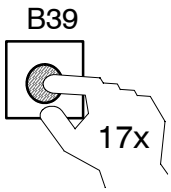
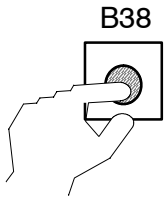
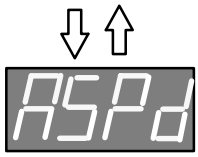
PULS = Pulse log
vTg = Speed over ground
vhW = Speed trough water

(vTg and vhW corresponds to NMEA 0183)</td></tr>
<tr><td>12</td><td colspan="2">PULS = Speed value from pulse log.
Indicated in Kts.
Displays -no- if no pulse log selected or connected.
Displays 0000 if there is no input from selected source.
Display range –80 Kts to +80 Kts (astern and ahead)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
11x

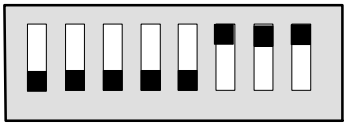
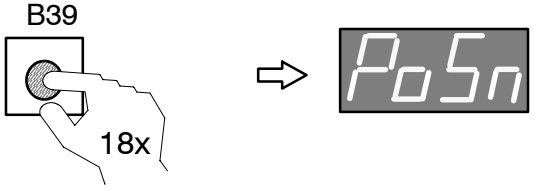
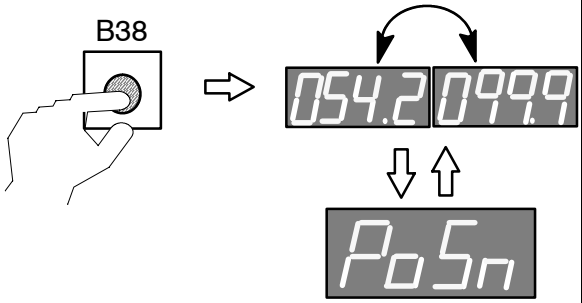
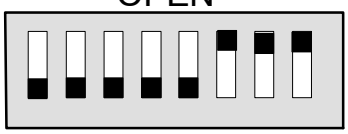
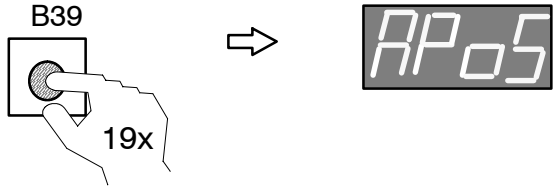
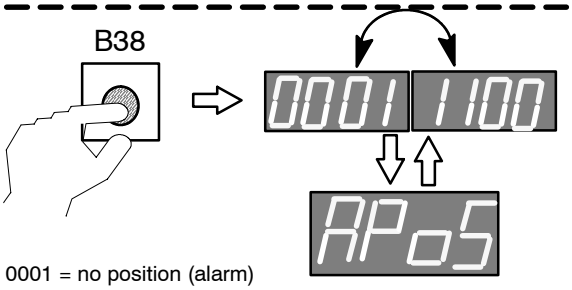
B38
 
  or
  </td></tr>
</table>

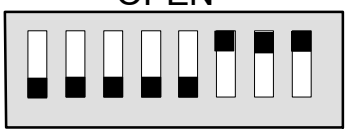
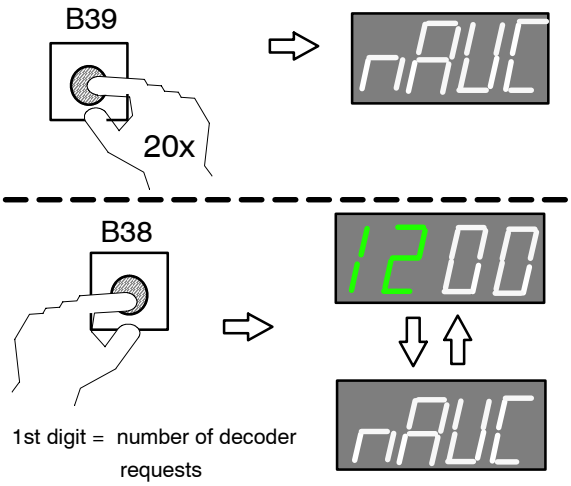
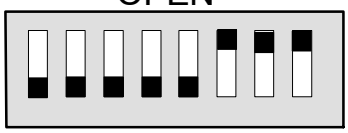
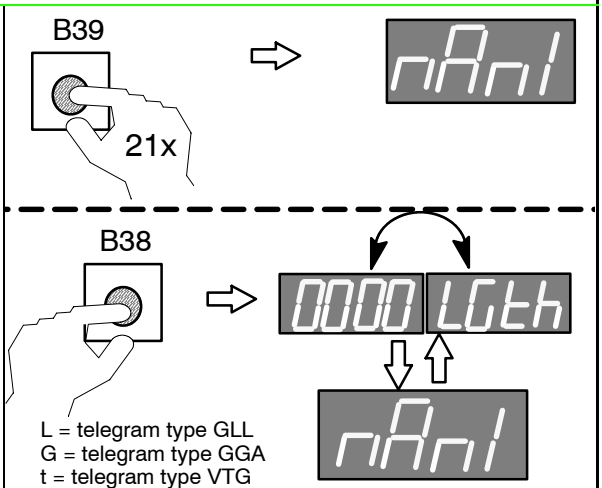
Seq. no.	Indications	Comments, Notes
13	vtG.S = Speed from GPS telegram (speed over ground).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  12x B38   No, or faulty data from GPS (vTg- telegram).
14	vtG.h = Course value from GPS telegram	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  13x B38   No, or faulty data from GPS (vTg- telegram).

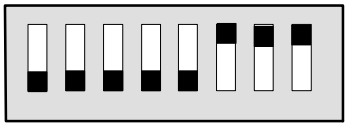
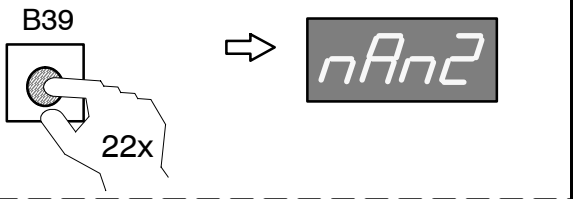
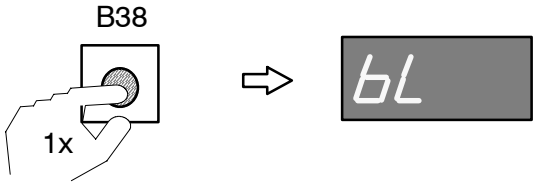
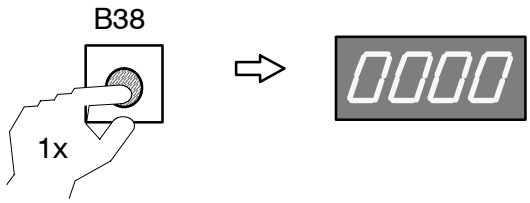
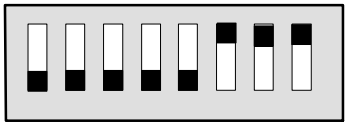
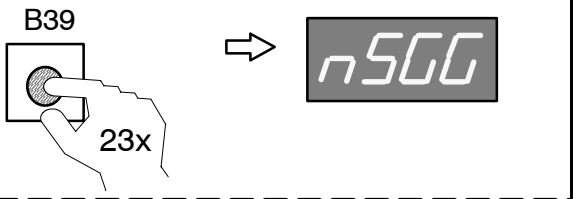
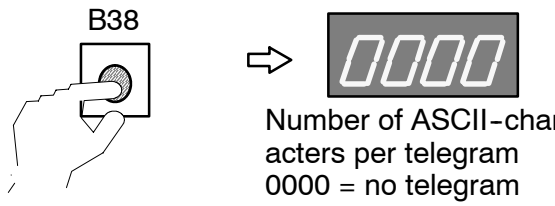
Seq. no.	Indications	Comments, Notes
15	vhw = Speed value in knots from NMEA telegram VHW (speed through water).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  B38   No, or faulty serial speed data (vHw- telegram).
16	SPd.L = Speed in knots (from Log). The speed for which the source has been selected, is displayed. The display alternates between 099.0 (=accepting value) and, say, 052.8 (speed in knots). If no value is accepted (transferred) the display stays at 099.0.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B38  B38   If the display changes value (similar as shown), there is a data transfer on this interface. No change (constant 99.0) means there is no data transfer

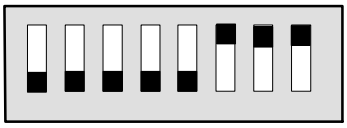
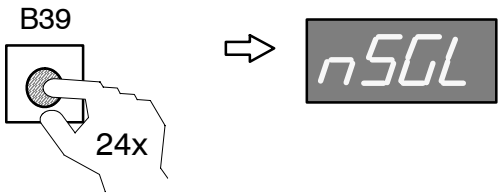
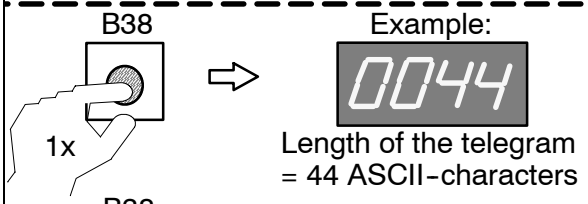
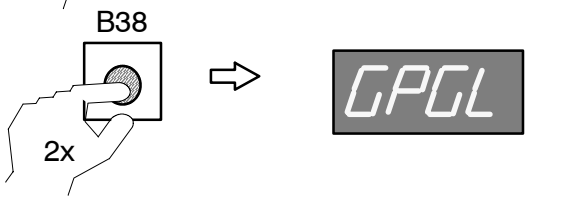
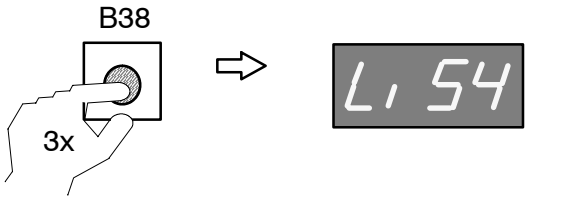
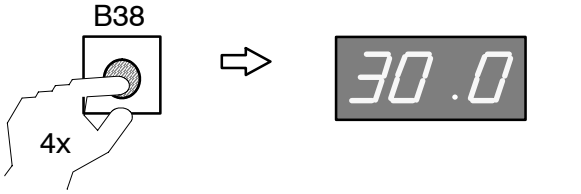
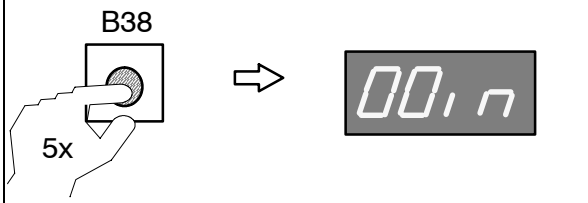
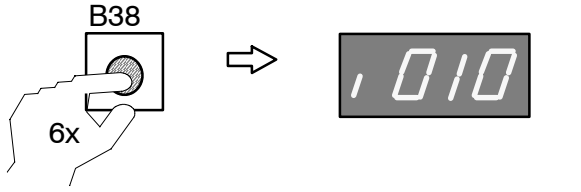
Seq. no.	Indications	Comments, Notes
17	PoS = Position – latitude in degrees.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  16x B38   No latitude data available (GPS defective).
18	ASPd = Alarm “speed”	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  17x B38  3 2 1 0 

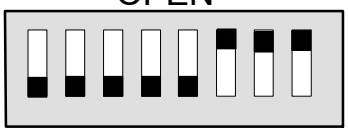
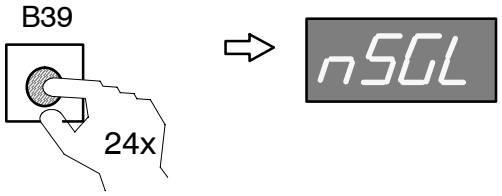
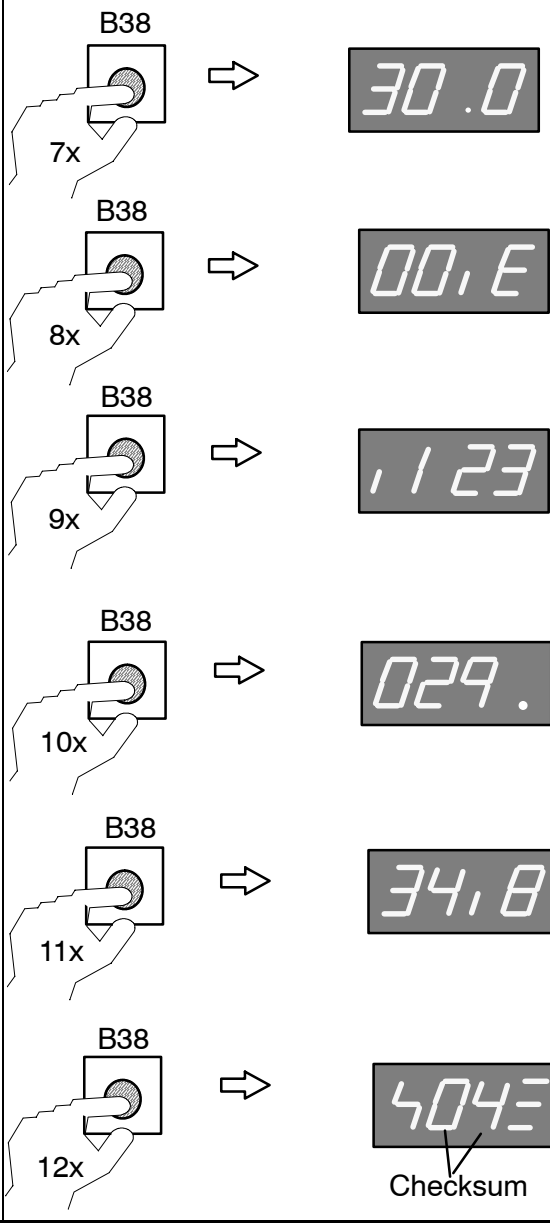
Digit 3 “Speed OK”	Display 1	Speed OK
	Display 0	Speed not OK
Digit 2 “Speed Alarm	Display 1	Speed Alarm
	Display 0	No Speed Alarm
Digit 1 “Auto Speed OK”	Display 1	Auto Speed OK
	Display 0	Auto Speed not OK
Digit 0 “Auto Alarm”	Display 1	Auto Speed Alarm
	Display 0	No Auto Speed Alarm

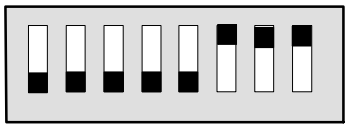
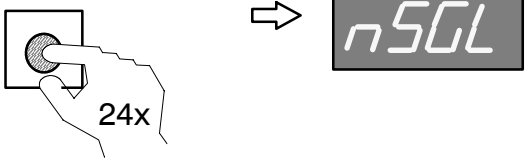
Seq. no.	Indications	Comments, Notes
19	PoSn = Latitude value derived from automatic latitude input. Indicated in degrees.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  B38  If the display changes value (similar as shown), there is a data transfer on this interface. No change (constant 099.9) means there is no data transfer
20	APoS = Alarm position input	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  B38  0001 = no position (alarm) 1100 = positon o.k.

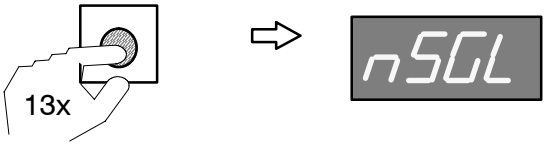
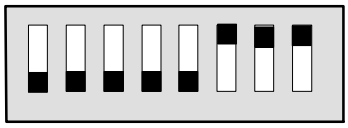
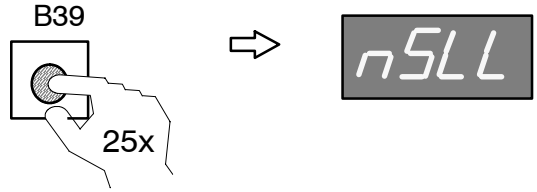
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>21</td><td colspan="2">nAUC = Number of telegrams with checksum.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td> 
1st digit = number of decoder requests
2nd digit = number of read-in NMEA-telegrams with correct check sum</td></tr>
<tr><td>22</td><td colspan="2">nAn1 = 1st table for NMEA-requests</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td> 
L = telegram type GLL
G = telegram type GGA
t = telegram type VTG
h = telegram type VHW
1st digit = number of L-types
2nd digit = number of G-types
3rd digit = number of t-types
4th digit = number of h-types</td></tr>
</table>

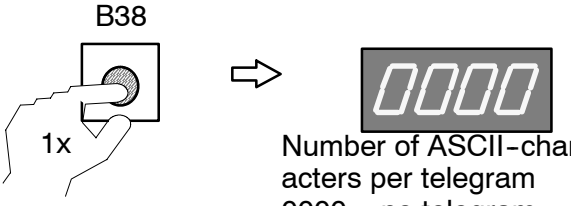
Seq. no.	Indications	Comments, Notes
23	nAn2 = 2nd table for NMEA-requests	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	   b = telegram type VBW l = telegram type SLL 1st digit = number of b-types 2nd digit = number of l-types
24	nSGG = NMEA-telegram (Strings of the GGA-telegram)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	  Number of ASCII-characters per telegram 0000 = no telegram The number of operations depends on the number of characters. (1 display content = max. 4 ASCII-character) **See sequ. no 25**

Seq. no.	Indications	Comments, Notes
25	nSGL = NMEA-telegram (Strings of the GLL-telegram)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	      

Seq. no.	Indications	Comments, Notes
cont. 25	nSGL = NMEA-telegram (Strings of the GLL-telegram)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	
		

<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>cont.
25</td><td colspan="2">nSGL = NMEA-telegram (Strings of the GLL-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 

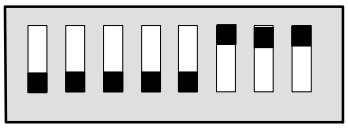
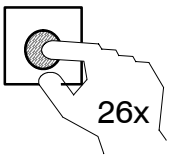
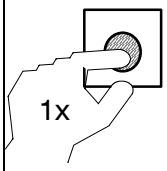
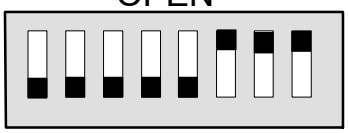
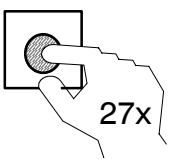
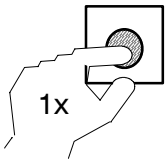
B38
 
</td></tr>
<tr><td></td><td colspan="2">With the 1st operation of the contact switch B38, the number of ASCII-characters is displayed.
If the display shows “0000”, no telegram-output took place.
With every further operation of contact switch B38, 4 consecutive ASCII-characters are displayed.</td></tr>
<tr><td>26</td><td colspan="2">nSLL = NMEA-telegram (Strings of the SLL-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 

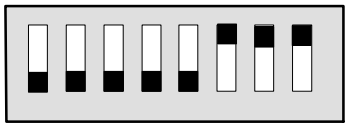
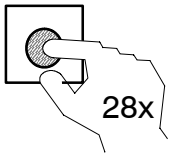
B38
 

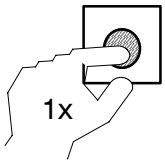
Number of ASCII-characters per telegram
0000 = no telegram

The number of operations depends on the number of characters.
(1 display content = max. 4 ASCII-characters)

See seq. no. 25</td></tr>
</table>

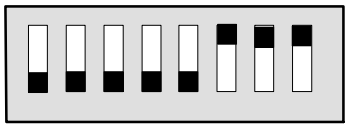
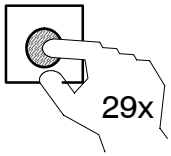
Seq. no.	Indications	Comments, Notes
27	nShw = NMEA-telegram (Strings of the VHW-telegram)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  26x B38  1x Number of ASCII-characters per telegram 0000 = no telegram The number of operations depends on the number of characters. (1 display content = max. 4 ASCII-characters) **See seq. no. 25**
28	nStG = NMEA-telegram (Strings of the VTG-telegram)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  27x B38  1x Number of ASCII-characters per telegram 0000 = no telegram The number of operations depends on the number of characters. (1 display content = max. 4 ASCII-characters) **See seq. no. 25**

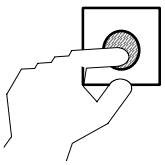
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>29</td><td colspan="2">nSbw = NMEA-telegram (String of the VBW-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
28x

B38
 
1x

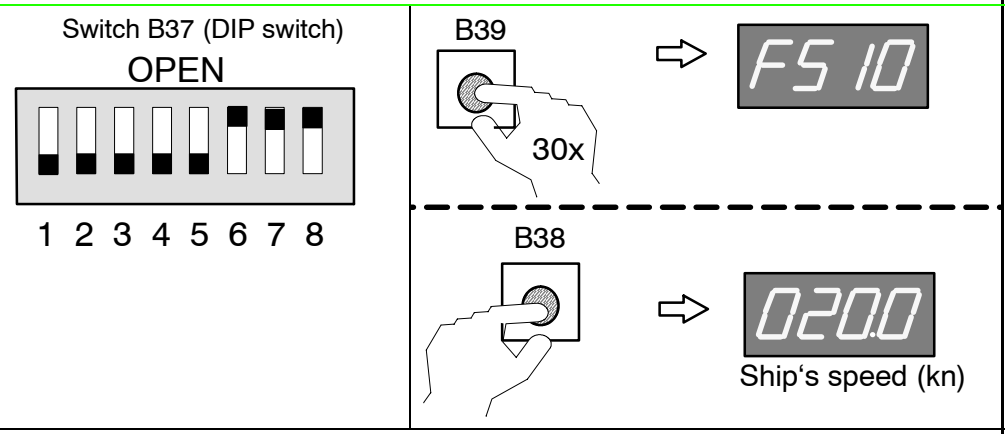
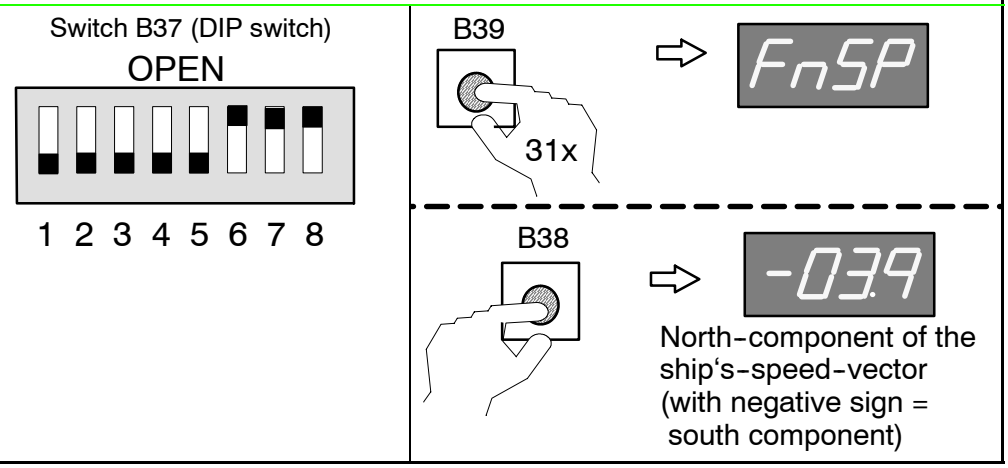
Number of ASCII-characters per telegram
0000 = no telegram

The number of operations depends on the number of characters.
(1 display content = max. 4 ASCII-characters)

See seq. no. 25</td></tr>
<tr><td>30</td><td colspan="2">Development only!
Fb10 = Software component of speed error correction: Latitude</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
29x

B38
 

Latitude</td></tr>
</table>

<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>31</td><td colspan="2">Development only!
FS10 = Software component speed error correction: Ship‘s speed
 
</td></tr>
<tr><td>32</td><td colspan="2">Development only!
FnSP = Software component speed error correction: North-component of the ship‘s-speed-vector
 
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<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>33</td><td colspan="2">Development only!
FutG = Software component speed error correction: Course over ground (Value of the VTG-telegram)</td></tr>
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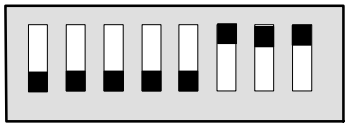
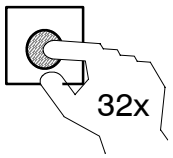
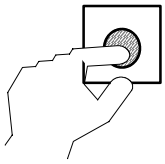
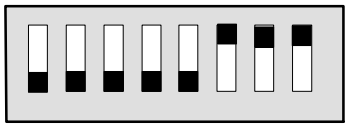
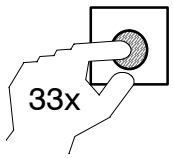
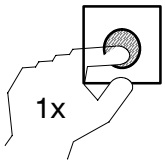
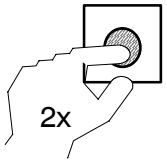
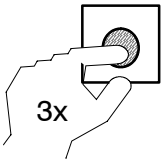
 
1 2 3 4 5 6 7 8</td><td>B39
 
32x

B38
 

0000 = no telegram
123.4 = course value</td></tr>
<tr><td>34</td><td colspan="2">tIME = Time since activating speed error correction. (Reset with power-off)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
33x

B38
 
1x

days (max. 99) hours
B38
 
2x

minutes seconds
B38
 
3x
 </td></tr>
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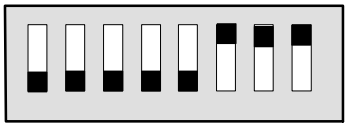
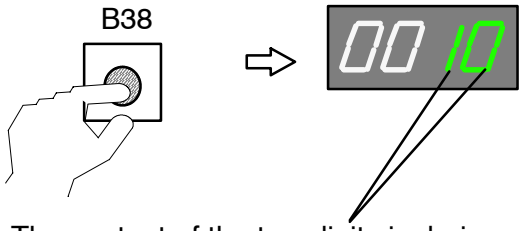
Seq. no.	Indications	Comments, Notes
35	**Development only!** SCI . = Serial Communication Interface (NMEA Log / GPS input)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39 34x B38  The content of the two digits is during a data transfer unrecognisable. Just the digits $1_{(16)}$ and $0_{(16)}$ are visible for a short moment; $10_{(16)}$ means line feed. All other sequentially indicated values are for development purpose only.

6 Tasks to be performed regularly

A task to perform regularly is to clean the internal of the gyro compass time by time. Especially the bottom filter has to be cleaned.

6.1 Changing the supporting liquid and distilled water

At 18 months intervals the supporting liquid and distilled water must be changed.

The supporting liquid and distilled water must not be changed whilst at sea
(except in the case of dual systems).

Tools/special tools required:
- Filling device
- Injector

Spare parts required:
- Supporting liquid
- Distilled water

If required:
- Screw (distilled water)
- Screw (supporting liquid)
- Screw (ventilation)

6.1.1 Removing the outer sphere from the compass enclosure

- Turn off the 24V power supply of the gyro compass and secure it against reconnecting.
- Undo the two screws at the top and bottom of the door of the gyro compass enclosure and lift out the door, paying attention to the earthing strip.
- Remove the plug from the outer sphere (see Figure 64/2).

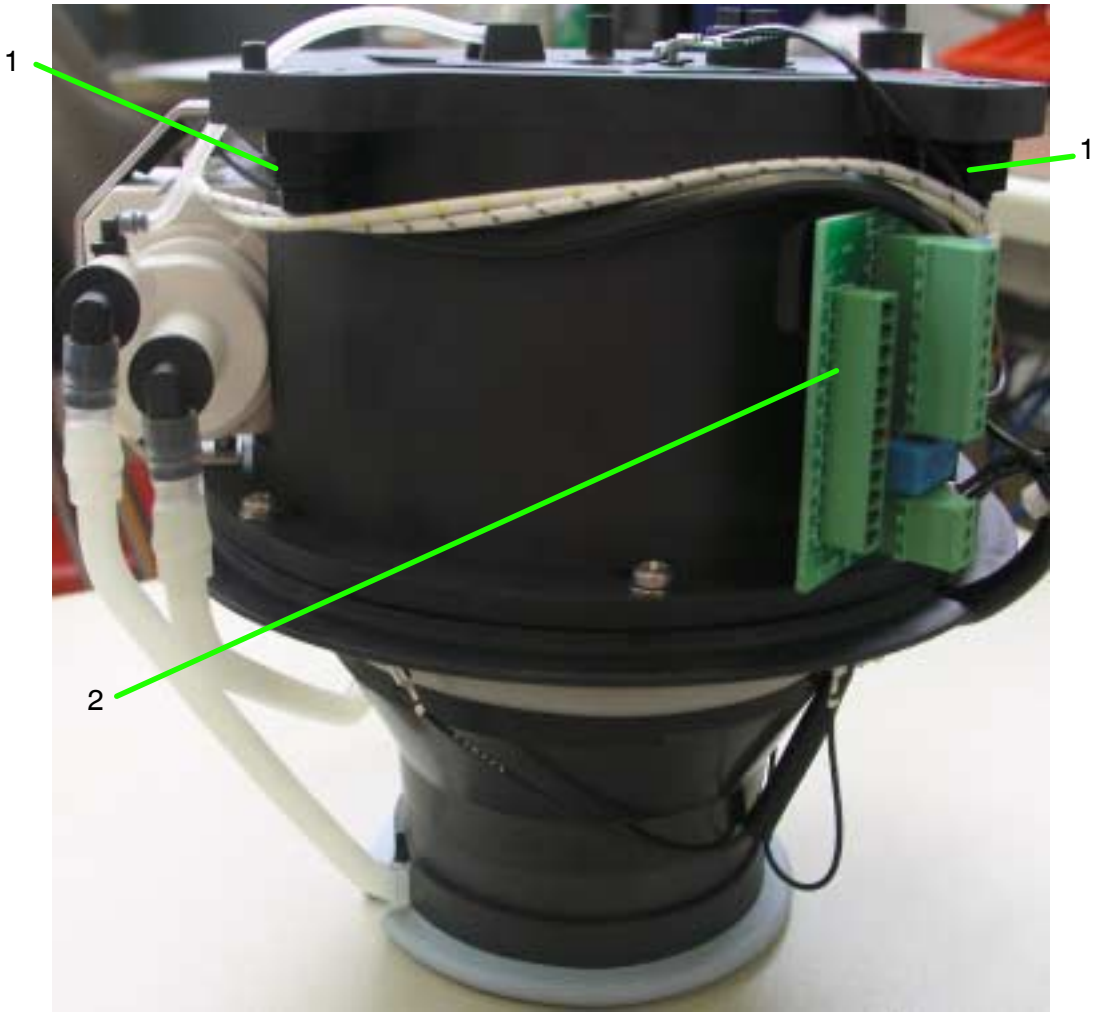


Figure 64: Dismantling the outer sphere

- Place both hands (see Figure 64/1) under 2 of the 4 snap closures and release them by pressing with the thumbs.
- Carefully turn the outer sphere through 90° and repeat the process with the other two snap closures. The outer sphere is now free and can be removed.
- Still holding the outer sphere with both hands, lower it slightly (this releases the locking device), carefully remove it from the compass enclosure and set it down.

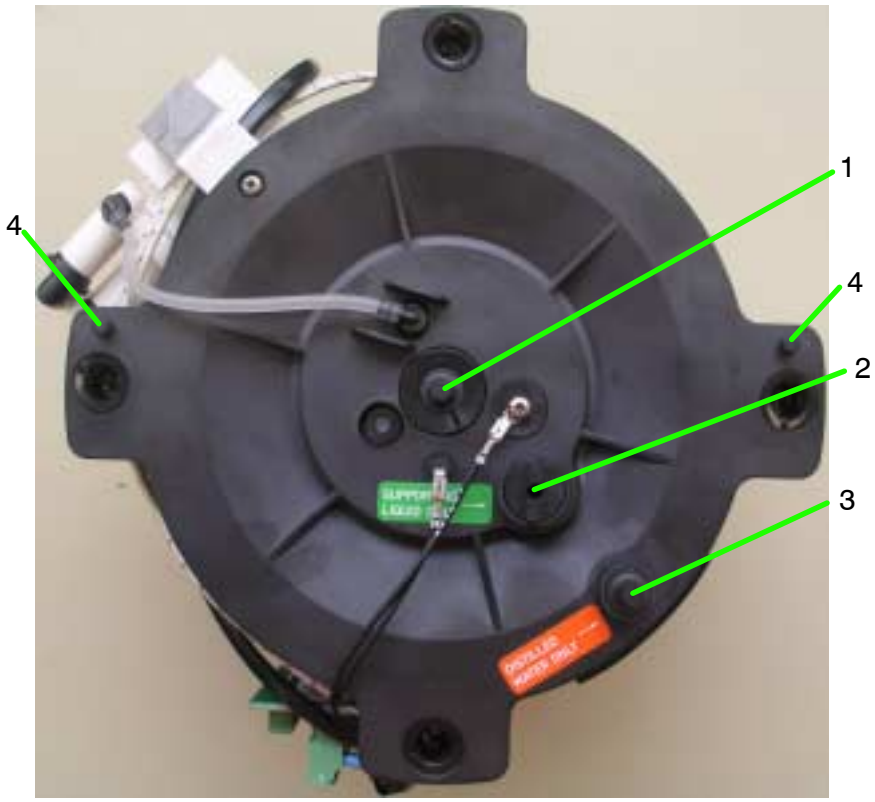


Figure 65: Dismantled outer sphere (overhead view)

6.1.1.1 Draining the supporting liquid and distilled water

(see Figure 65)

- Remove the ventilation screw (Figure 65/1) to vent the system
- Remove the supporting liquid screw (Figure 65/2) so that the supporting liquid can be poured out
- Holding the outer sphere with both hands, pour out the supporting liquid and throw it away (no special measures are needed for disposal).
- Remove the distilled water screw (Figure 65/3), so that the distilled water can be poured out. Remove the remaining distilled water from the outer sphere with the injector.

- Used supporting liquid and used distilled water must not be reused.
- All the following tasks on the outer sphere must be carried out slowly. On no account do them jerkily. Slow handling is necessary, because otherwise the gyrosphere will fail to float in the supporting liquid, and jerky movements will cause it to strike against the inner wall of the outer sphere. There is a risk of damage. Continue to handle in this way until you have finished filling with the new liquids.

- After pouring out the liquids (distilled water and supporting liquid) for the first time, **slowly** return the outer sphere to the initial position.
- Wait approximately 3 to 5 minutes (until the remaining content of the distilled water container has flowed into the outer sphere) and then carefully repeat the pouring out process. If necessary, use the injector to suck out the remaining distilled water through the distilled water filling opening.
- Attach the filling device to the distilled water bottle and pour the entire contents (230cm^3) into the distilled water filling opening (look for the identifying label).
- Close the distilled water filling opening with the screw. Use a new sealing ring.
- Attach the filling device to the supporting liquid bottle and pour the supporting liquid (840cm^3) into the supporting liquid filling opening (look for the identifying label).
- Check the liquid level at the measuring cone (Figure 65/1).
- Using the injector, top up or suck out supporting liquid (check via the measuring cone) until the “liquid level: OK” is reached.
- Close the distilled water filling opening with the screw. Use a new sealing ring.

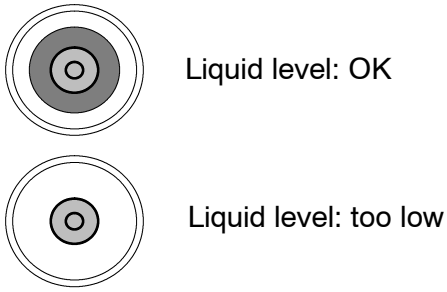


Figure 66: Measuring cone (top view)

- Close the distilled water filling opening with the screw.
  Use a new sealing ring.
- Place the outer sphere in the compass enclosure.

- Pay attention to the two locking pins (Figure 65/4) on the closure.

- Hold the outer sphere with both hands and guide it under the snap closures on the pendulum joint.
- Using the thumbs, press down and engage the two snap closures.
- Carefully turn the outer sphere through 90° and repeat the process with the other two snap closures. The outer sphere is now fastened to the pendulum joint.
- Guide the cable with the plug to the left around the outer sphere and plug it in as shown in (Figure 64/2).
- Close the door of the enclosure and fasten it with screws, paying attention to the earthing strip.

When the power supply is switched on, the compass is ready for use again. Run the heating and settling in stage as described in section 3.4.3.2.

7 Error messages and warnings

7.1 Error messages

An error is indicated in the digital display of the compass by a flashing “Erro” (for error).

HEADING IS NOT DISPLAYED

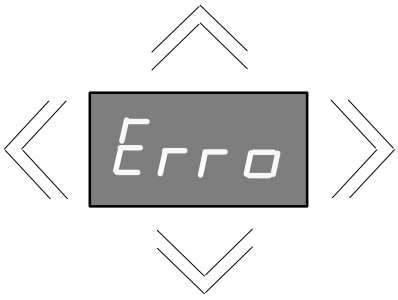


Figure 67: “Error message” in digital display

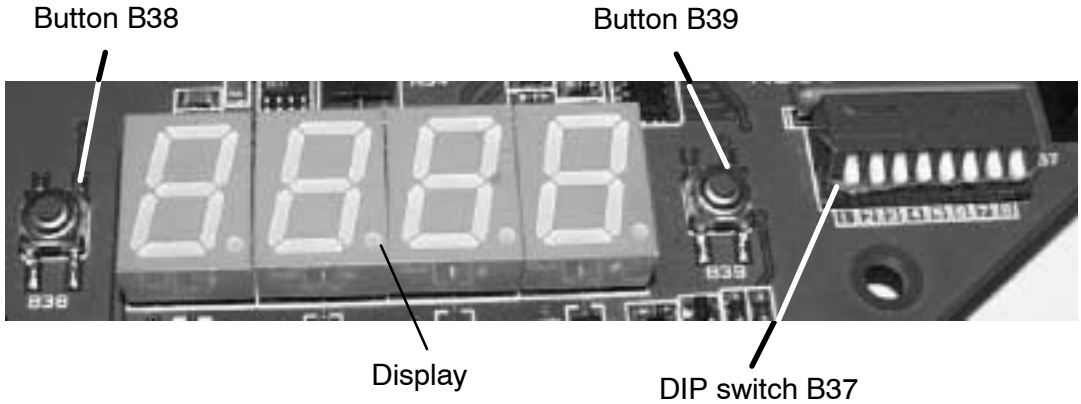


Figure 68: DIP switch B37 and buttons B38/B39

When button B38 is pressed (as long as it is pressed) one of the following error groups is displayed:

PCbP = Error on Power PCB
PCbS = Error on sensor PCB
PCbC = Error on connection PCB
PCbG = Error on gyro PCB

A more precise error classification is obtained by pressing both buttons B38 and B39 simultaneously. As long as they are pressed, the following errors may be displayed:

Error-log	Comment	Error group	Dis-play
E.L.01	Serial connection of sensor card to network card faulty	PCbP	Er.01
E.L.02	Inductive transmission faulty	PCbP	Er.02
E.L.03	System voltage (B5.5 ⇒ B5.8) on network card faulty	PCbP	Er.03
E.L.04	Encoder voltage faulty	PCbP	Er.04
E.L.05	System voltage (B5.1 ⇒ B5.4) on network card faulty	PCbP	Er.05
E.L.06	Encoder faulty	PCbS	Er.01
E.L.07	CAN dialogue from gyro card to sensor card faulty	PCbS	Er.02
E.L.08	Follow-up system faulty	PCbS	Er.03
E.L.09	CAN1 and CAN2 operating voltage faulty	PCbC	Er.01
E.L.10	Supporting liquid error	PCbG	Er.01
E.L.11	System voltage (B21.5 ⇒ B21.8) on gyro card faulty	PCbG	Er.02
E.L.12	Operating voltage 24V faulty	PCbG	Er.03
E.L.13	Operating voltage 15V faulty	PCbG	Er.04
E.L.14	Heating operating voltage (B21.1 ⇒ B21.4) faulty	PCbG	Er.05
E.L.15	Operating voltage 72V faulty	PCbG	Er.06
E.L.16	Operating voltage 78V faulty for 400 Hz	PCbG	Er.07
E.L.17	Gyro supply $55V_{eff}$ faulty	PCbG	Er.08
E.L.18	Gyro current faulty	PCbG	Er.09
E.L.19	Pump voltage faulty	PCbG	Er.10
E.L.20	Pump current faulty	PCbG	Er.11
E.L.21	Temperature sensor faulty	PCbG	Er.12
E.L.22	Serial interface MC1 to MC2 faulty	PCbG	Er.13
E.L.23	CAN interface from sensor card to gyro card faulty	PCbG	Er.14
E.L.24	Heating system faulty	PCbG	Er.15

7.2 Warnings

Warning indicate a malfunction during operational use.
The heading continues to be displayed.
A warning is indicated by a flashing decimal point.

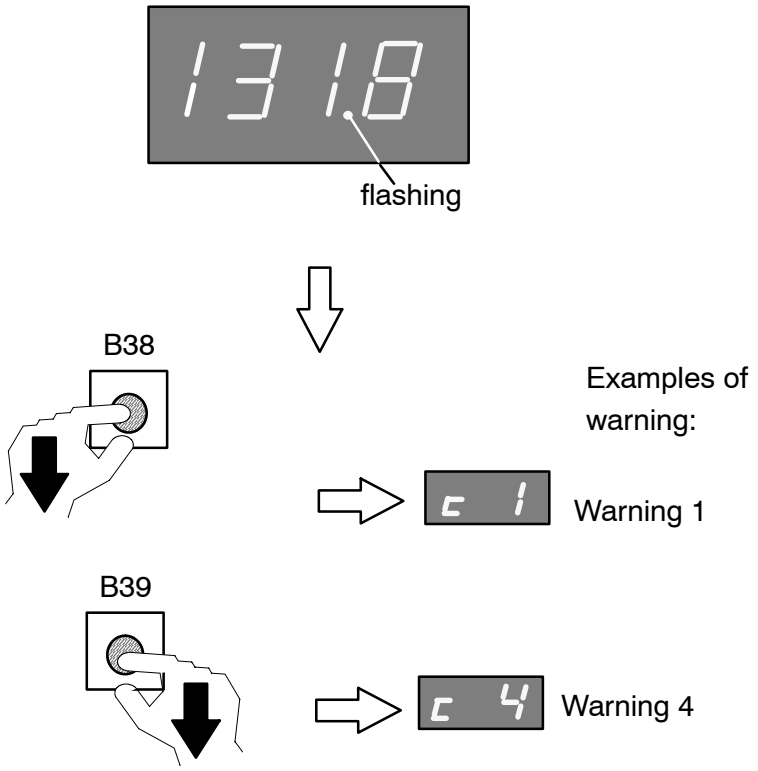


Figure 69: DIP switch B37 and button B38/B39

The following warnings may appear:

C1= Fan failure
C2= Heater failure
C3= Supporting liquid > 60°C
C4= Supporting liquid level too low
C5= Voltage cut-off

7.2.1 Warning 1 “Fan failure”

This warning is generated if the fan does not switch itself on as a result of the temperature of the supporting liquid (it should switch on when the supporting liquid reaches 51°C).
Whether the fan is operational or not is registered from the fan’s current consumption; it therefore follows that the fan is defective if this warning is displayed.
To prevent overheating due to fan failure, it is recommended that you do the following:

- Check whether the fan screen is covered and check to see that air can enter the enclosure unhindered at the base.
- Open the door on the compass
- If necessary cool the outer sphere using an external fan.

These measures should be continued until warning 1 stops.

It is essential that the fan be replaced at the earliest opportunity.

NOTE: A critical situation occurs, if the ambient temperature is extremely high and warning 3 is displayed “Temperature of supporting liquid more than 60°C”. Constant high temperature may effects to the life cycle of the gyro compass. A higher temperature for a short moment has no importance.

7.2.2 Warning 2 “Heater failure”

This warning is output when the heater (≥45°C) has failed.

Compass operation is not restricted if the temperature is more than 45°C (see also warning “fan failure”.

A temperature drop down below 45°C leads to an error message “Error” and the heading information will not longer displayed (as well as the heading information to the connected heading receivers).

To prevent the supporting liquid from cooling further, it is recommended that to do the following:

- Close the door on the compass, or
- introduce warm air.

These measures should be continued until warning 2 stops.

It is essential that the heater be repaired at the earliest opportunity.

7.2.3 Warning 3 “Supporting liquid > 60°C”

This warning is output when the temperature of the supporting liquid is higher than 60°C.

To prevent the temperature from rising further, it is recommended that you do the following:

- Open the door on the compass
- If necessary cool the outer sphere using an external fan.
- Check the ambient temperature. If the ambient temperature is higher than 60°C steps should be taken to cool it down.

These measures should be continued until warning 3 stops.

If warning 3 is displayed in combination with warning 1, the fan must be replaced at the earliest opportunity.

See also warning “fan failure”

7.2.4 Warning 4 “Supporting liquid level too low”

This warning is output when the level of the supporting liquid in the outer sphere is too low. The supporting liquid is determined by an immersion probe installed in the upper part of the outer sphere.

You must check the supporting liquid immediately and if necessary top up with distilled water (one 240cm^2 bottle) in to the ventilation outlet until the measuring cone shows the desired level, the remaining content of the bottle has to be filled into the inlet for distilled water, see service manual).

This measure does not compensate the planned replacement of the supporting liquid!!!

In certain circumstances (if the level of the supporting liquid falls suddenly) you must establish the cause (possibly a leak) and correct the fault.

If the level of supporting liquid is too low, the gyro-current is interrupted and an Error is displayed,the heading information will not longer displayed (as well as the heading information to the connected heading receivers).

Please note: At the Operator Unit for Gyro compass STD 20 this warning is shown as C4 “Temperature”.

7.2.5 Warning 5 “Voltage cut-off”

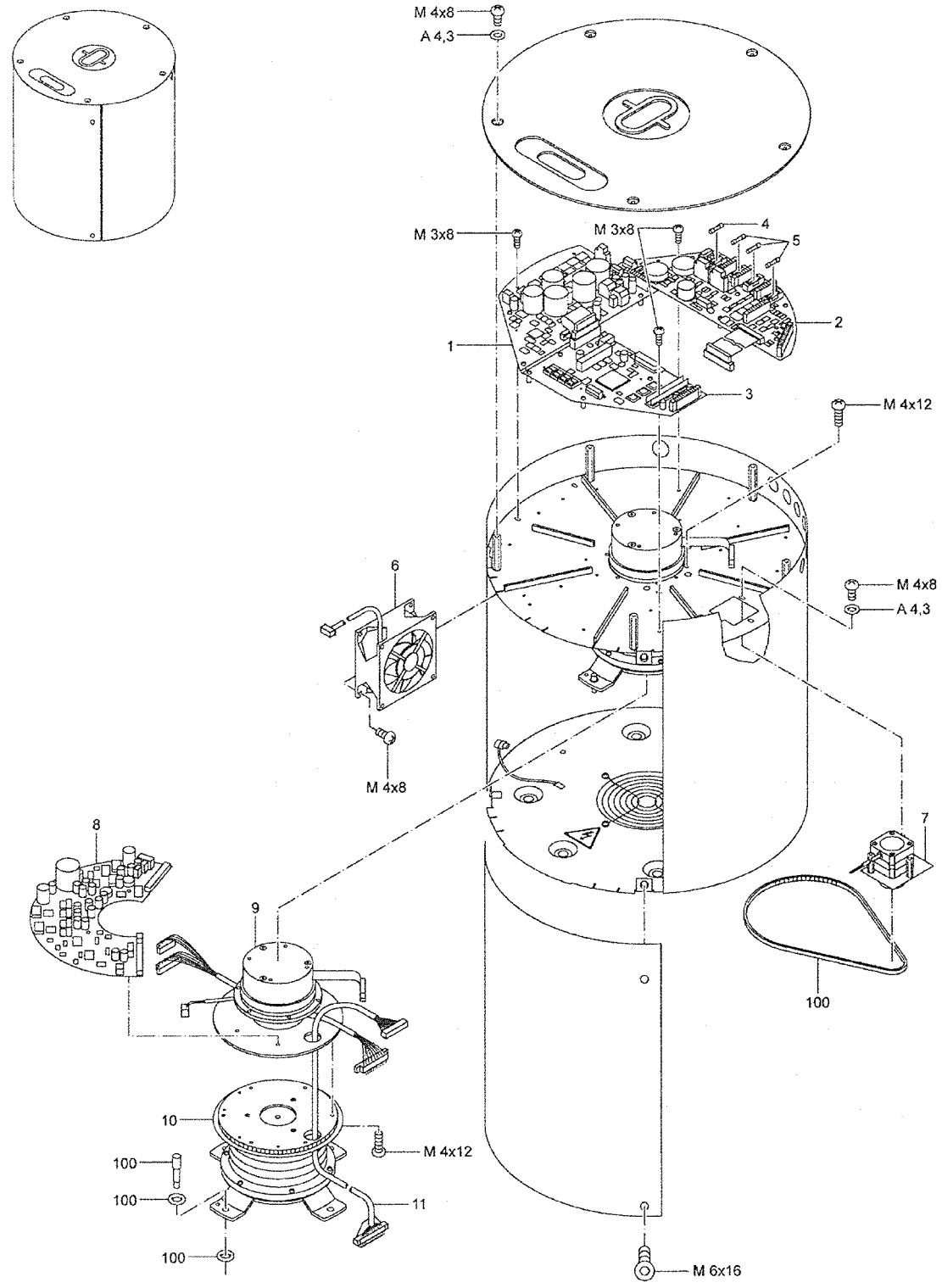
This warning is output if the supply voltage is cut off for a short time. The cut-off period is determined by the fall in supporting liquid temperature. If the temperature falls below 45°C the compass recognises that the voltage supply has been switched off in the conventional way.

In the case of a voltage cut-off (supporting liquid temperature does not fall to below 45°C) and the voltage supply has been restored, the settling stage in indicated again (see also section 3.4.3.2 “Compass indications during the settling stage”).

Note: Heading indication can be incorrect. Wait for a complete follow up,
Check voltage supply to the gyro compass!

Kreiselkompaß STD.22
Gyro Compass STD.22
Type 110-233.NG001

Ersatzteilkatalog
SPARE PARTS
CATALOGUE

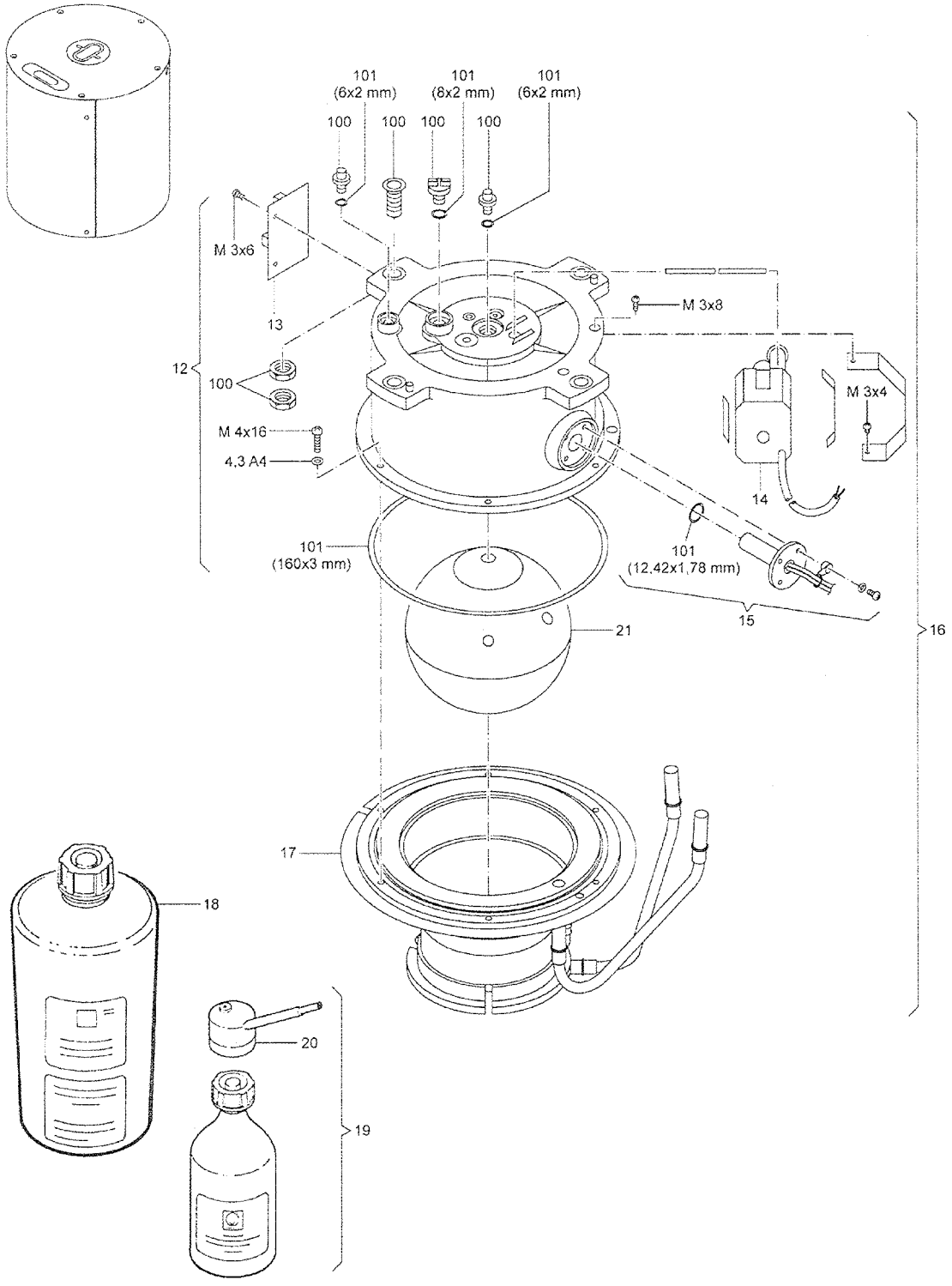


14.617

Kreiselkompaß STD.22
Gyro Compass STD.22
Type 110-233.NG001

ANSCHÜTZ

Ersatzteilkatalog
SPARE PARTS
CATALOGUE



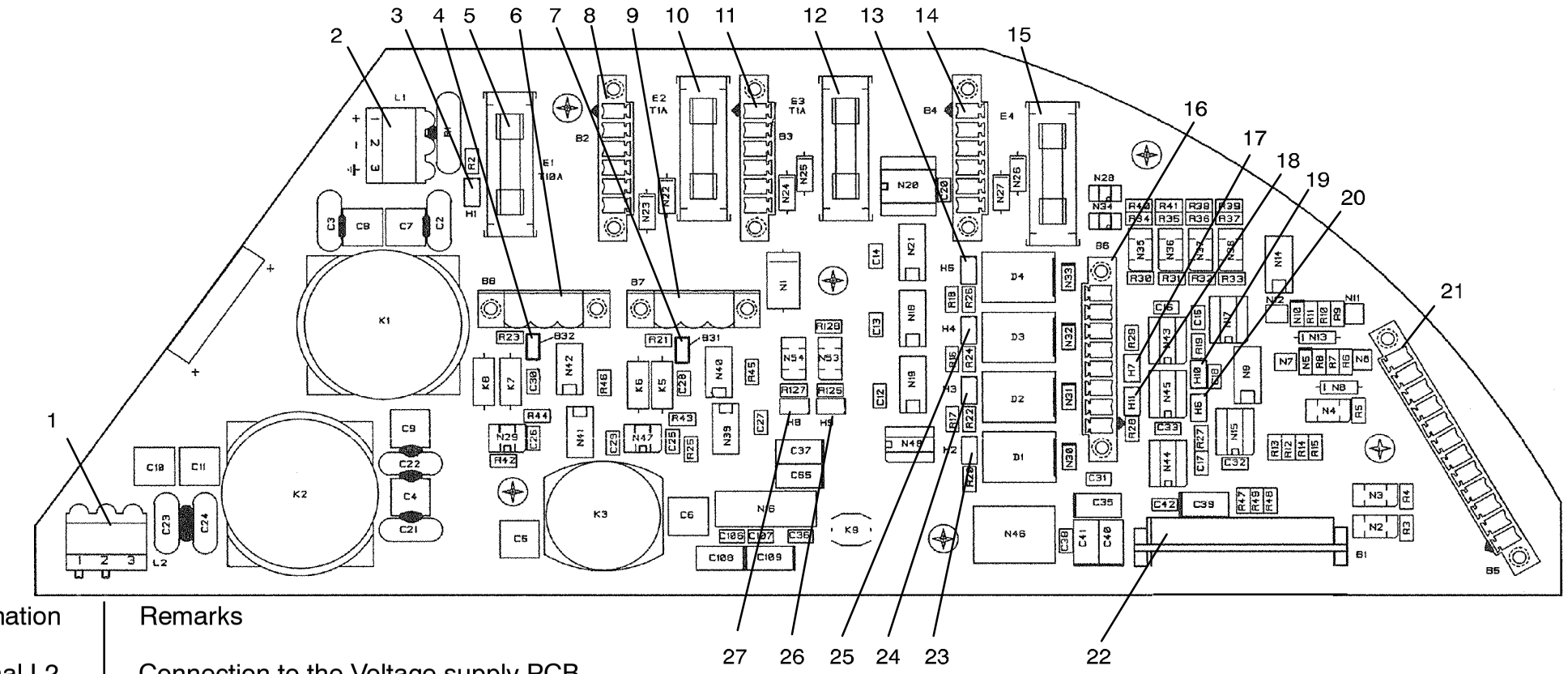
Kreiselkompaß STD.22
Gyro Compass STD.22
Type 110-233.NG001

Ersatzteilkatalog
SPARE PARTS
CATALOGUE

Pos.	Lager-Nr. Stock-No.	Benennung	Designation	Zeichnungs-Nr. Part-No.	Stck. Qty.	Herst.-Code MFRC	Versorgungs-Nr. NSN
1	3604361	SPG-Versorgung	Power Supply PCB	110-233.102	1	D2865	
2	3604352	Anschluss-PCB	Connection PCB	NB 05-356	1	D2865	
3	3604660	Sensor-PCB	Sensor PCB	110-233.X08	1	D2865	
4	1762140	G-Sicherungseinsatz	Fuse	T 10 A L 250V 19195	1	D8882	5920-12-314-2556
5	1762017	G-Sicherungseinsatz	Fuse	T 1 A L 250V IEC 127-2	3	D8882	5920-12-167-4252
6	1504226	Lüfter	Fan	110-233.00-002	1	D2865	
7	3604068	Schrittmotor, vollst.	Step Motor, compl.	110-233.47	1	D2865	
8	3604360	Hüllkugel-PCB	Outer Sphere PCB	110-233.101	1	D2865	
9	3604567	Encoder, kompl.	Encoder, compl.	110-233.X01	1	D2865	
10[1]	3604060	Gelenk	Hinge	110-233.11	1	D2865	
11	3604090	Kabelstamm	Cable Loom	110-233.28	1	D2865	
12	3604569	Obere Hüllkugel	Upper Hemisphere	110-233.X07	1	D2865	
13	3604661	Klemmenleiste mit Temperatursensor	Terminal PCB with Temperature Sensor	110-233.X09	1	D2865	
14	3602315	Pumpe	Pump	110-231.40	1	D2865	
15	3602608	Heizung, kompl.	Heater, compl.	110-231.X01	1	D2865	
16	3604568	Hüllkugel, kompl.	Outer Sphere, compl.	110-233.X04	1	D2865	
17	3604571	Untere Hüllkugel	Lower Hemisphere	110-233.X02	1	D2865	
18	1502254	Tragflüssigkeit	Supporting Liquid	148-162 E01	1	D2865	6810-12-160-1000
19	1508499	Destilliertes Wasser	Distilled Water	148-398	1	D2865	
20	1507674	Kappe	Filler Pipe	148-398.00-002	1	D2865	5340-12-349-9869
21	4004566	Kreiselkugel, neu	Gyrosphere, new	111-006.E01	1	D2865	6605-12-349-5847
	4004792	Kreiselkugel, AT	Gyrosphere, Reconditioned	111-006.E01 AT		D2865	
100	3604573	Kleinteile-Satz	Set of small Parts	110-233.X50		D2865	
101	3608939	Satz Dichtungen	Set of Gaskets	110-222.X01		D2865	5330-12-343-3789
	3604572	Schraubensatz	Set of Screws	110-233.X03		D2865	

[1] incl. Pos. 11

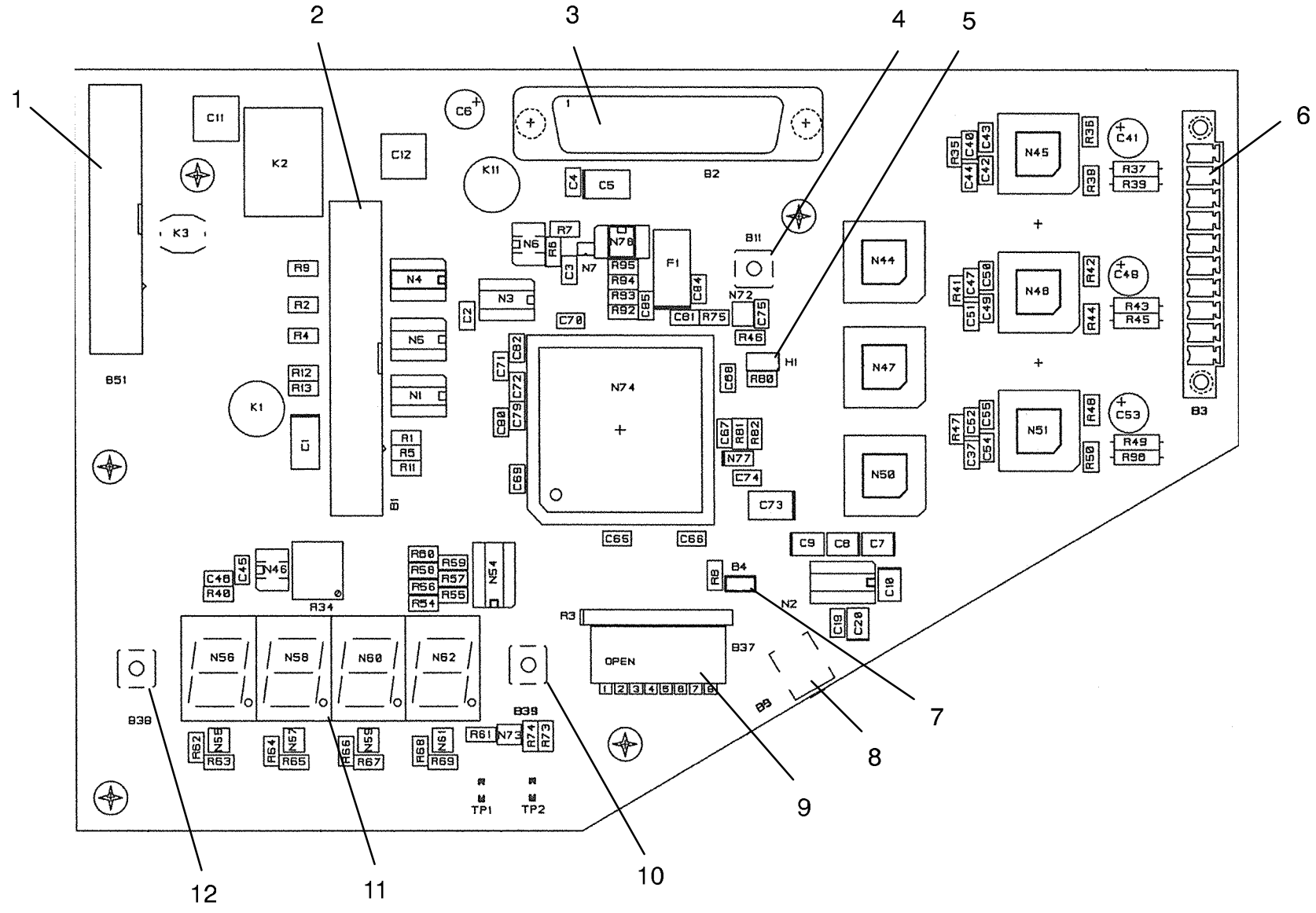
All depicted items which are not mentioned in the text are not applicable for this unit. Since further development may necessitate making modifications to existing equipment, its conformity with the relevant illustrations and drawings is not always ensured. Raytheon Marine will be under no liability whatever that may arise from any such differences.



No.	Designation	Remarks
1	Terminal L2	Connection to the Voltage supply PCB
2	Terminal L1	Connection Supply Voltage 24VDC
3	LED H1	Indication Supply Voltage 24VDC
4	Jumper B32	Terminator for für CAN1
5	Fuse E1	Compass, 10A, T
6	Plug B8	CAN-bus, CAN1
7	Jumper B31	Terminator for CAN2
8	Plug B2	serial Interface NMEA/Coursebus Channel1
9	Plug B7	CAN-Bus, CAN2
10	Fuse E2	Channel1, 1A, T
11	Plug B3	serial Interface NMEA/Coursebus Channe2
12	Fuse E3	Channel2, 1A, T
13	LED H5	Function indicator of relay D4, AVAILABLE
14	Plug B4	Output Coursebus
15	Fuse E4	Coursebus output, 1A, T
16	Plug B6	Statussignals
17	LED H7	Output Channel2 (lights up red = Coursebus)
18	LED H11	Output Channel2 (lights up green = NMEA)
19	LED H10	Output Channel1 (lights up green = NMEA)
20	LED H6	Output Channel1 (lights up red = Coursebus)
21	Plug B5	NMEA In, Puls Log In, QS (STD 22C)
22	Plug B1	Connection to the Sensor PCB
23	LED H2	Function indicator of relay D1, QS
24	LED H3	Function indicator of relay D2, SEC
25	LED H4	Function indicator of relay D3, System error
26	LED H9	CAN2 Supply Voltage +5VDC
27	LED H8	CAN1 Supply Voltage +5VDC

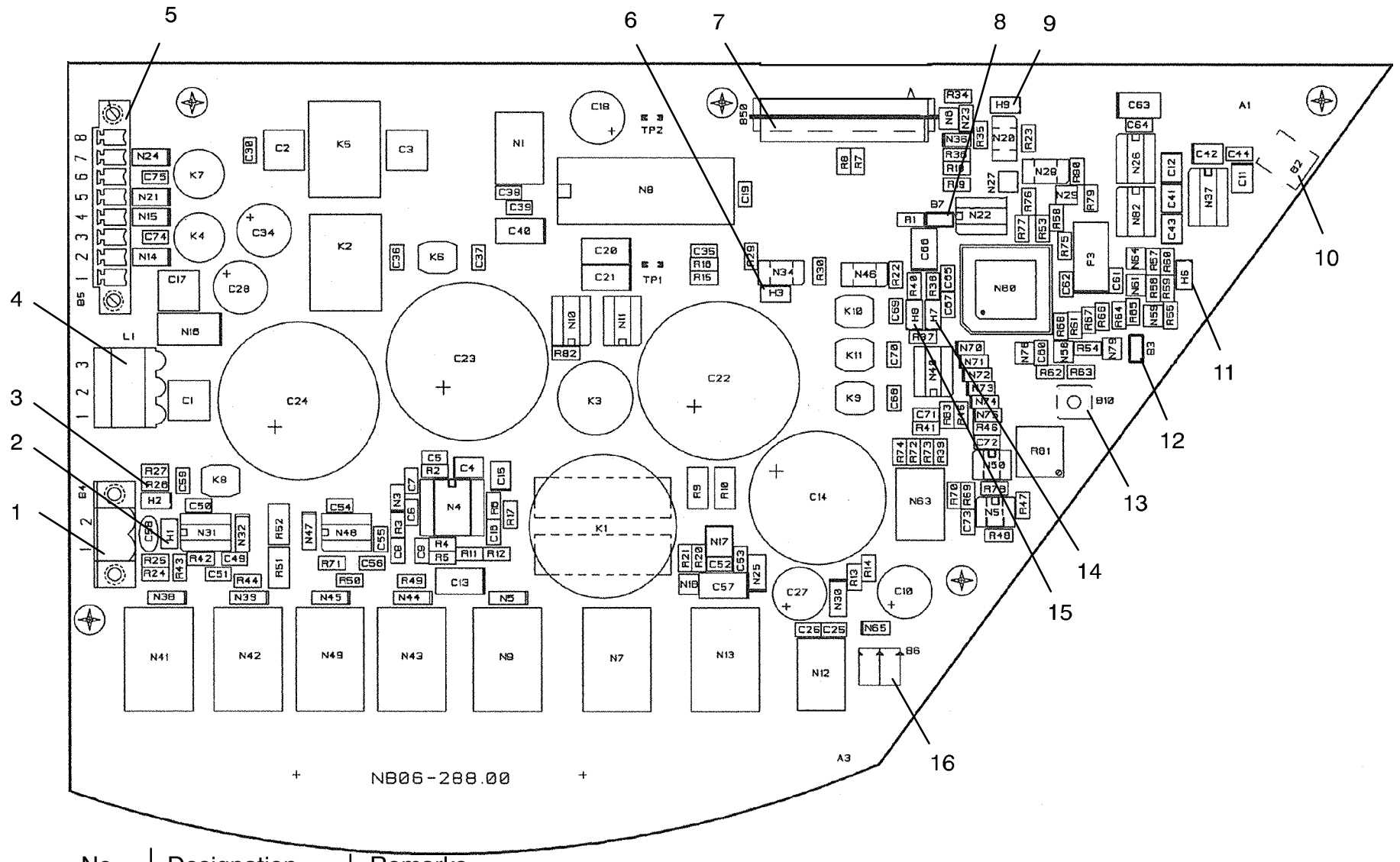
Annex 1

NB05-356
Anschluss-PCB



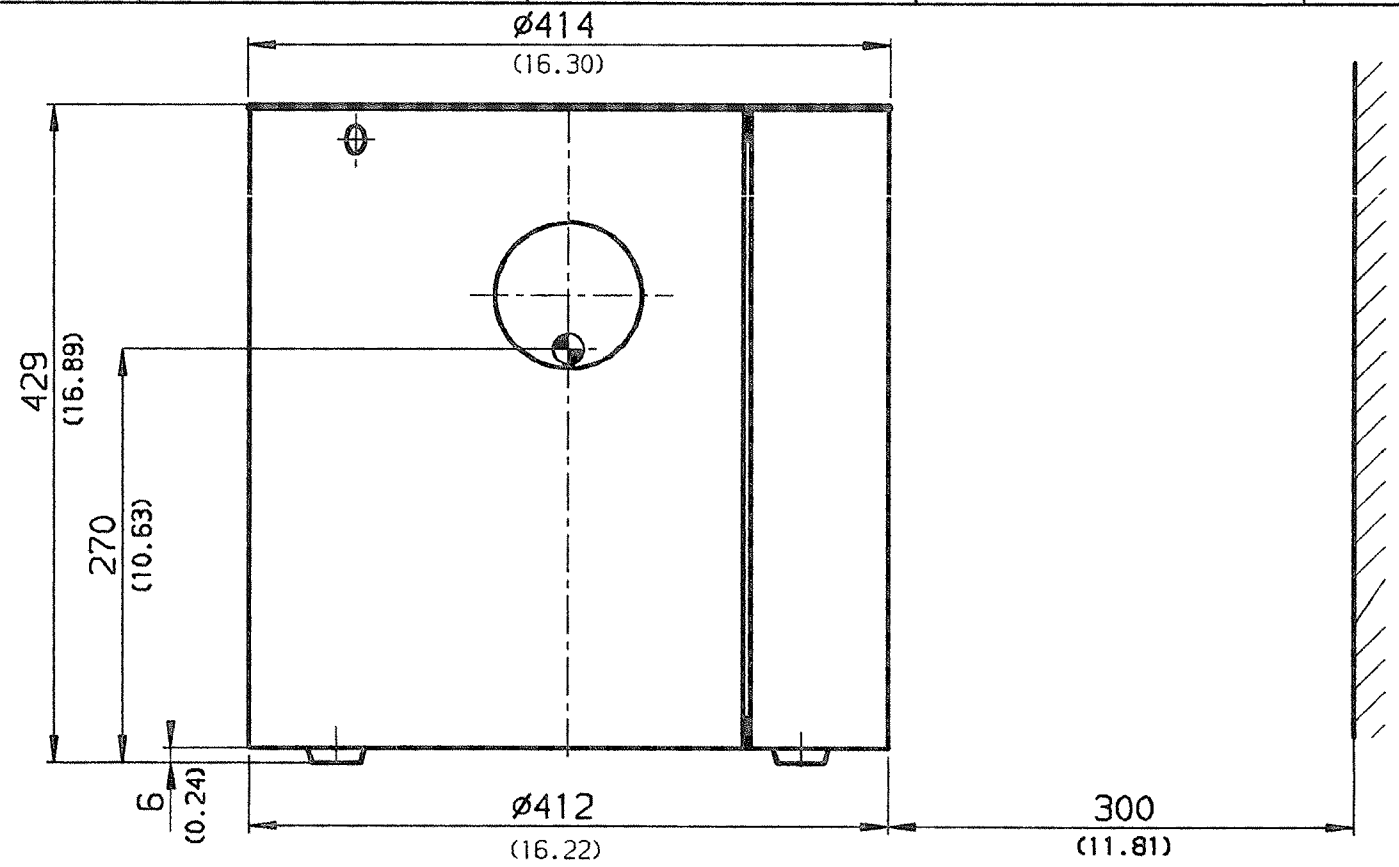
No.	Dsignation	Remarks
1	Plug B51	Connection to Supply PCB (STD 22)
2	Plug B1	Connectio to the NMEA-THREESTATE-MODUL
3	Plug B2	Connection to the Shaft-Encoder
4	Push button B11	Processor Reset
5	LED H1	Processor monitoring
6	Plug B3	Connection to the step motor
7	Jumper B4	Testpurpose only, Output Coursebus or NMEA
8	Plug B9	Connection for programming FLASH-PROM
9	DIP switch B37	Setting of parametrs and operation modes, read-out of Compass information
10	Push button B39	Selection and setting in combination with DIP switch
11	Display	Selection and setting in combination with DIP switch
12	Push button B38	Selection and setting in combination with DIP switch

Annex 2
NB06-282
SENSOR PCB



No.	Designation	Remarks
1	Plug B4	Connection inductivity primary coil
2	LED H1	Output voltage for inductie transmission
3	LED H2	Output voltage for inductie transmission
4	Terminal L1	Connection for Ship‘s supply 24VDC
5	Plug B5	Connection inductivity secondary coil
6	LED H3	Operating voltage relay-supply 12VDC
7	Ülug B50	Connection to the Sensor PCB
8	Jumper B7	Only for manufacturers application
9	LED H9	Operating voltage Shaft-Encoder 15VDC
10	Plug B2	Connection for programming FLASH-PROM
11	LED H6	lights up (red) while programming
12	Jumper B3	Must be set to FLASH the processor
13	Push button B10	Prozessor Reset
14	LED H7	lights up (red) on malfunction of the supply PCB
15	LED H8	Procerssor monitoring
16	Plug B6	Connection for the fan

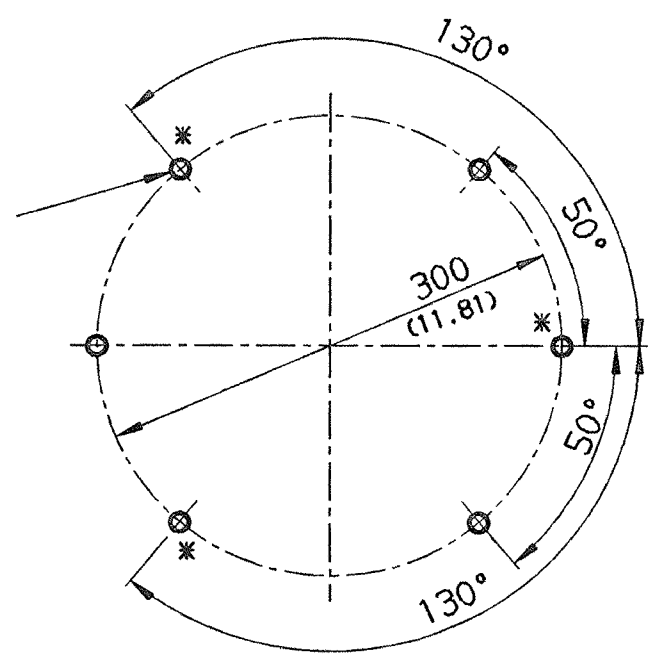
Annex 3
110-233.102
SPG. VERSORGUNG (STD 22)

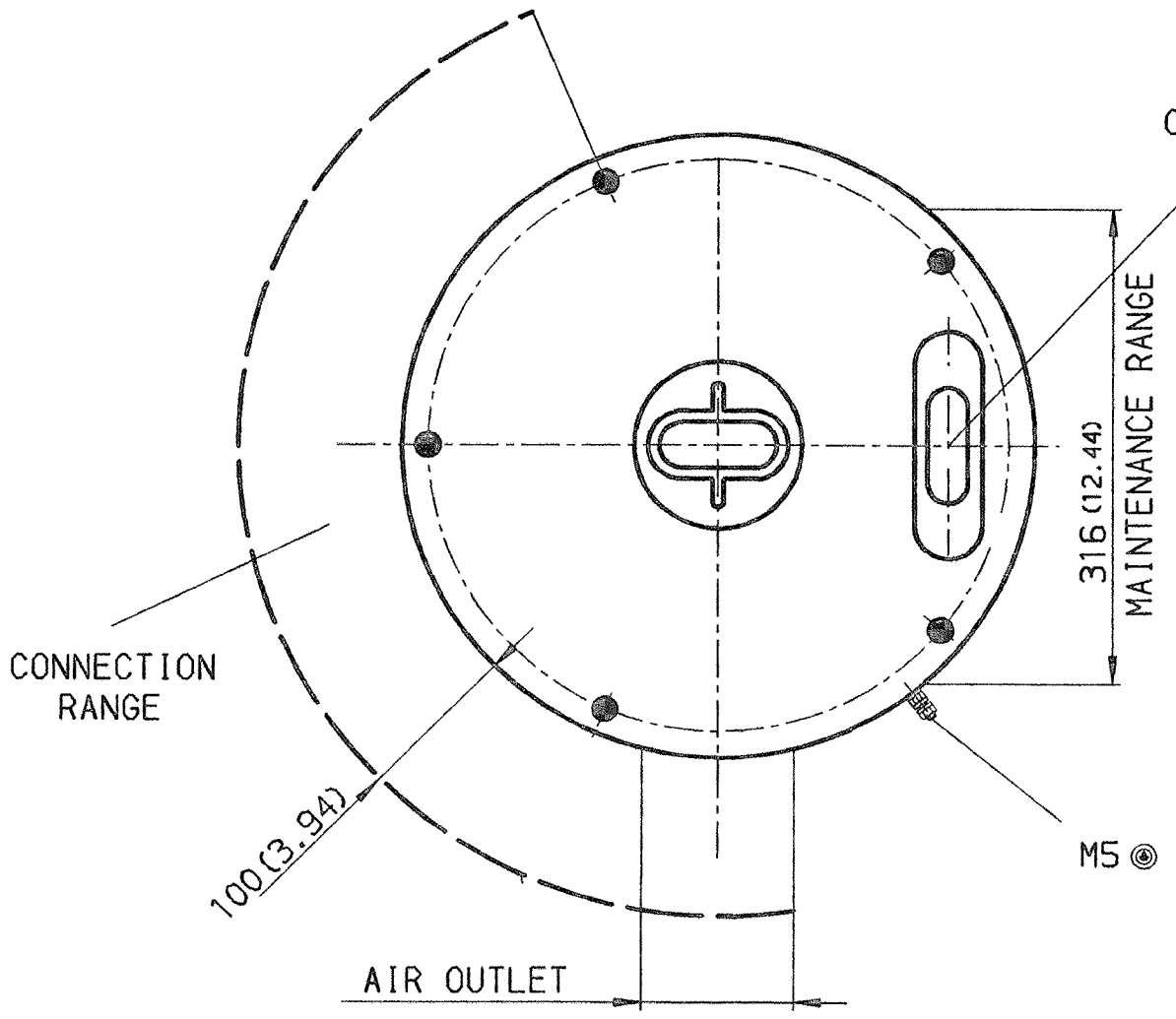


ø12,5(ø0.49) FOR M10 OR
MAX. ø11(ø0.43)
FOR WOOD SCREW MAX.

*WITH CIVILIAN APPLICATION
SUFFICIENTLY

DRILLING SCHEME





⊕-CENTRE OF GRAVITY

TYPE OF ENCLOSURE: IP 23

DIMENSIONS WITHOUT TOLERANCES ARE
MAXIMUM DIMENSIONS

+0,5 -0,5
DIN 6784

DISTANCE FROM MAGNETIC COMPASS
STANDARD TYPE: m STEERING TYPE: m

mm
(INCH)

REV.	REVISIONS	DATE	NAME
A	.	14.05.03	Kop

	DATE	NAME
2003		
DR.	07.05.	Kop
APPR.		
CHK.		
RELEASE:		

Raytheon
Raytheon Marine GmbH
Germany

SCALE –
WEIGHT: 16 kg

DRAWING TITLE:
GYRO COMPASS
DIMENSIONAL DRAWING

DRAWING NO.: 110 D 233 HP005
SH. 1
OF 1

DISTRIB. UNIT STD22
138-118 NG001

U2
I/O PCB
138-118.101

B7 B8 B9 B23 B24 B25 B26 B27 B28 B29 B30

STEP OUTPUT (6ST/1*)

SERIEL OUTPUTS (COURSE BUS H SER/NMEA)

CHN 1 CHN 2 CHN 3 CHN 4 CHN 5 CHN 6 CHN 7 CHN 8

STATUS/ALARM

SYSTEMALARM
SENSORALARM G1
SENSORALARM G2
SENSORALARM G3/GPS
SENSORALARM TMC
MONITORALARM GYRO/TMC
SENSOR-DIFF. ALARM
TMC SELECTED
GYRO SELECTED
GPS COMPASS SELECTED
CAN DISTURBED
RESERVE

B11 B12 B13 B14 B15 B16 B17 B18 B19 B20 B21 B22

R.o.T
COURSE PRINTER
MAGN. SENSOR (TMC)

B5 B6 B2 B3

110-233.HP009
05015896

U1
INTERFACE PCB
138-118.100

PULSE LOG INPUT
PULSE LOG DIR. INPUT
STATUS TWN EQUIPMENT INPUT
400 HZ
BOOSTER
SYSTEM
RX MINS
COURSE BUS
DV-BUS

L2

PULSLOG
200 OD.400 P/NM
INPUT

NMEA
GPS
INPUT

0183
LOG
INPUT

CAN 1
CAN 2
1 CAN L
2 CAN H
3 GND

B6 B7

SHIELDED CABEL
TWISTED 1/2
CROSS SECTION
≥ 0.5 ²

U7 U9 U7 U9

U3
VOLTAGE DISTRIBUTION
138-118.02

FILTER 1
U4

FILTER 2
U5

U6
HFA75M40C

L1

E1 E2

STRANDED WIRES
TWISTED

GYRO 1 GYRO 2

24V 0V

U7
U8

N860-043/3,0M LG

* BUILD LOOP THROUGH FERRITE CORE
(FERRITE CORES ARE DELIVERED
WITH THE DISTRIBUTION UNIT)

CAD B 4521 E

	DATUM	NAME
2003		
BEARB	10.10.	ARENDT/KE
GEPR	10.10.	
NORM	10.10.03	
FREIG	B / 18.06.03	

BLATT	ZUST	ÄNDERUNG	DATUM	NAME
3	D	6494.110	10.10.03	KE
1-3	C	6477.110	03.09.03	KE
	B		170603	ADT
1+2+3	A		130603	ADT

Raytheon
Raytheon Marine GmbH
Germany

BENENNUNG
GYRO COMPASS STD.22
CABLE AND CONNECTION DIAGRAM

ZEICHNUNGSNUMMER
110-233.HP009

BL. 1
VON 3

ERS.FÜR | ERS.DURCH

U3.L1 U1.B7 U1.B6 U3.L1

U7 OPERATOR UNIT 130-613

⏚ 0V +24V — U3.L1.⏚ U3.L1.15 U3.L1.11 — B7

CAN 2: 1 CAN L, 2 CAN H, 3 GND — U1.B7.1 U1.B7.2 U1.B7.3 — B2 — U8.B5.1 U8.B5.2 U8.B5.3

CAN 1: 1 CAN L, 2 CAN H, 3 GND — U1.B6.1 U1.B6.2 U1.B6.3 — B1 — U8.B4.1 U8.B4.2 U8.B4.3

SHIELDED CABEL TWISTED 1/2 CROSS SECTION ≥ 0.5²

NB60-043/3.0M LG

U8 REPEATER 133-560

⏚ 0V +24V — U3.L1.⏚ U3.L1.17 U3.L1.12

COURSE BUS/NMEA: RX+ RX- — L1 — U7.B2.1 U7.B2.2 U7.B2.3

CAN 2: 1 CAN L, 2 CAN H, 3 GND — B5

CAN 1: 1 CAN L, 2 CAN H, 3 GND — U7.B1.1 U7.B1.2 U7.B1.3 — B4

110-233 GYRO COMPASS STD.22 — U9

NB05-356 CONNECTION PCB

OUTPUT (CHN 1) COURSE BUS (H SER) / NMEA — OUTPUT (CHN 2) COURSE BUS (H SER) / NMEA — OUTPUT COURSE BUS

H1 GN; E1 T10A; E2 T1A; E3 T1A; E4 T1A

L1: 24V 0V ⏚ — B2: 24V 0V TX+ TX- TX GND ⏚ — B3: 24V 0V TX+ TX- TX GND — B4: 24V 0V TX+ TX- TX GND

OUTPUT: H2 GN, H3 GN, H4 RD, H5 GN — B6: OS, SEC, SYSTEM, AVAILABLE

INPUT — B5: +24V, SET OS INPUT, PULSLOG INPUT, PULSLOG DIR INPUT, RX+ NMEA LOG INPUT, RX- NMEA LOG INPUT, RX+ GPS INPUT, RX- GPS INPUT

CAN 1 — B7: 1 CAN L, 2 CAN H, 3 GND — U1.B6.3 U1.B6.2 U1.B6.1

CAN 2 — B8: 1 CAN L, 2 CAN H, 3 GND — U10.B7.1 U10.B7.2 U10.B7.3 — U1.B7.3 U1.B7.2 U1.B7.1 — U10.B8.1 U10.B8.2 U10.B8.3

U3.L1.2 U3.L1.4 — CROSS SECTION ≥ 2.5²

U1.B6 U1.B7

SHIELDED CABEL TWISTED 1/2 CROSS SECTION ≥ 0.5²

110-233 GYRO COMPASS STD.22 — U10

NB05-356 CONNECTION PCB

OUTPUT (CHN 1) COURSE BUS (H SER) / NMEA — OUTPUT (CHN 2) COURSE BUS (H SER) / NMEA — OUTPUT COURSE BUS

H1 GN; E1 T10A; E2 T1A; E3 T1A; E4 T1A

L1: 24V 0V ⏚ — B2: 24V 0V TX+ TX- TX GND ⏚ — B3: 24V 0V TX+ TX- TX GND — B4: 24V 0V TX+ TX- TX GND

OUTPUT: H2 GN, H3 GN, H4 RD, H5 GN — B6: OS, SEC, SYSTEM, AVAILABLE

INPUT — B5: +24V, SET OS INPUT, PULSLOG INPUT, PULSLOG DIR.INPUT, RX+ NMEA LOG INPUT, RX- NMEA LOG INPUT, RX+ GPS INPUT, RX- GPS INPUT

CAN 1 — B7: 1 CAN L, 2 CAN H, 3 GND — U11.B7.3 U11.B7.2 U11.B7.1

CAN 2 — B8: 1 CAN L, 2 CAN H, 3 GND — U9.B7.1 U9.B7.2 U9.B7.3 — U11.B8.3 U11.B8.2 U11.B8.1 — U9.B8.1 U9.B8.2 U9.B8.3

U3.L1.7 U3.L1.9 — CROSS SECTION ≥ 2.5²

SHIELDED CABEL TWISTED 1/2 CROSS SECTION ≥ 0.5²

U11.B8 U11.B7

CAD B 4521 D

	DATUM	NAME
2003		
BEARB	03.09.	ARENDT/KE
GEPR	03.09.	
NORM	1.10	
FREIG	B / 18.06.03	

C	6477.110	03.09.03	KE	
B		170603	ADT	
A		130603	ADT	
ZUST	ANDERUNG	DATUM	NAME	

Raytheon Marine GmbH Germany

BENENNUNG: GYRO COMPASS STD.22 — CABLE AND CONNECTION DIAGRAM

ZEICHNUNGSNUMMER: 110-233.HP009 — BL. 2 — VON 3

ERS.FÜR — ERS.DURCH

110-233
GYRO COMPASS STD.22

U11

NB05-356
CONNECTION PCB

OUTPUT (CHN 1) COURSE BUS (H SER) / NMEA
OUTPUT (CHN 2) COURSE BUS (H SER) / NMEA
OUTPUT COURSE BUS
OUTPUT
INPUT
CAN 1
CAN 2

H1 GN
E1 T10A
E2 T1A
E3 T1A
E4 T1A
H2 GN
H3 GN
H4 RD
H5 GN

L1: 24V, 0V, ⏚
B2: 24V, 0V, TX+, TX-, TX GND, ⏚
B3: 24V, 0V, TX+, TX-, TX GND, ⏚
B4: 24V, 0V, TX+, TX-, TX GND, ⏚
B6: OS, SEC, SYSTEM, AVAILABLE
B5: +24V, SET OS INPUT, PULSLOG INPUT, PULSLOG DIR.INPUT, RX+ NMEA LOG INPUT, RX- , RX+ GPS INPUT, RX-
B7: 1 CAN L, 2 CAN H, 3 GND
B8: 1 CAN L, 2 CAN H, 3 GND

U14.L1.1
U14.L1.2
U10.B7.3
U10.B7.2
U10.B7.1
U10.B8.3
U10.B8.2
U10.B8.1
U10.B7
U10.B8

SHIELDED CABEL TWISTED 1/2 CROSS SECTION ≥ 0.5 ²

CROSS SECTION ≥ 2.5 ²

U12 (OPTION)
121-062
AC/DC-CONVERTER
LINE FILTER LOAD
85-264VAC 47-63HZ
0V
+24V
U3.L1.1
U3.L1.E1
CROSS SECTION ≥ 2.5 ²
AC/DC CONVERTER
P~ N~ ⏚
AC
N~
P~
L1

U13 (OPTION)
121-062
AC/DC-CONVERTER
LINE FILTER LOAD
85-264VAC 47-63HZ
0V
+24V
U3.L1.6
U3.L1.E2
CROSS SECTION ≥ 2.5 ²
AC/DC CONVERTER
P~ N~ ⏚
AC
N~
P~
L1

U14 (OPTION)
121-062
AC/DC-CONVERTER
LOAD FILTER LINE
AC/DC CONVERTER
P~ N~ ⏚
AC
N~
P~
L1
U11.L1.1 +24V
U11.L1.2 0V
85-264VAC 47-63HZ

CAD B 4521 E

		DATUM	NAME
	2003	DATUM	NAME
BEARB		10.10.	ARENDT/KE
GEPR		10.10.	
NORM		10.10.03	
FREIG		8 / 10.06.03	

D	6494.110	10.10.03	KE
C	6477.110	03.09.03	KE
B		170603	ADT
A		130603	ADT
ZUST	ANDERUNG	DATUM	NAME

Raytheon Marine GmbH
Germany

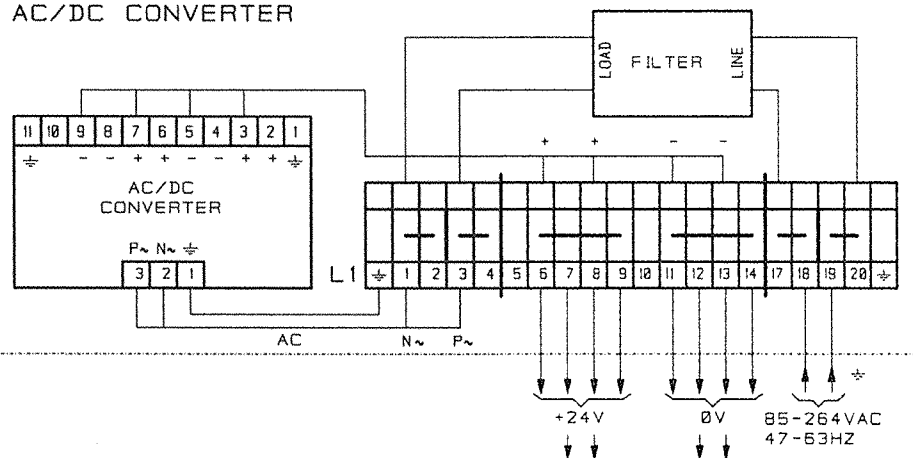
BENENNUNG
GYRO COMPASS STD.22
CABLE AND CONNECTION DIAGRAM

ZEICHNUNGSNUMMER
110-233.HP009

BL. 3
VON 3

ERS.FÜR
ERS DURCH

121-062 (OPTION)
AC/DC CONVERTER



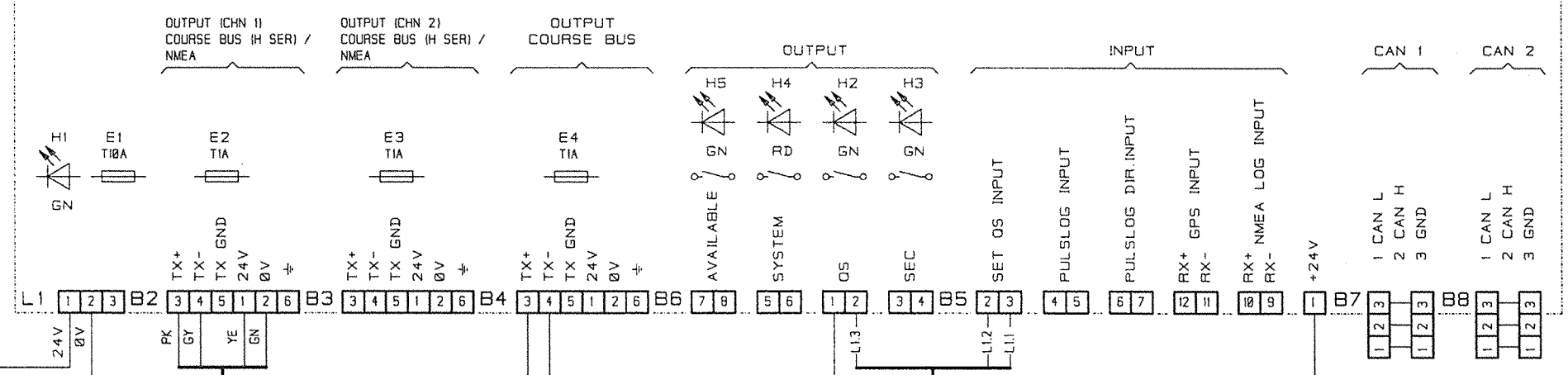
(OR SHIP'S MAINS)

CROSS SECTION ≥ 2.5 ²

CROSS SECTION ≥ 0.5 ²

110-233
GYRO COMPASS STD.22

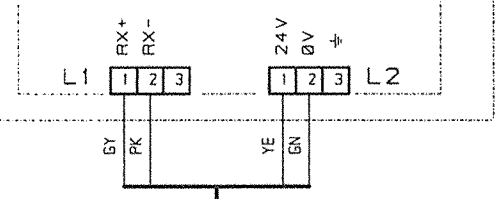
NB05-356
CONNECTION PCB



CROSS SECTION ≥ 0.5 ²

133-558 (OPTION)
STEERING REPEATER

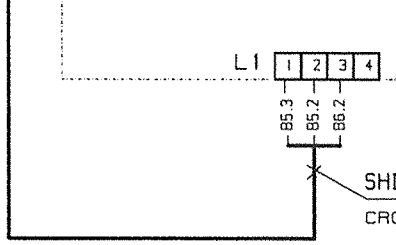
NB06-256
REPEATER COMPASS PCB



NB60-043
3.0M LG.

SHIELDED CABLE
CROSS SECTION ≥ 0.5 ²

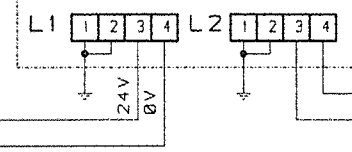
130-606 (OPTION)
OPERATOR UNIT QUICK SETTLING



SHIELDED CABLE
CROSS SECTION ≥ 0.5 ²

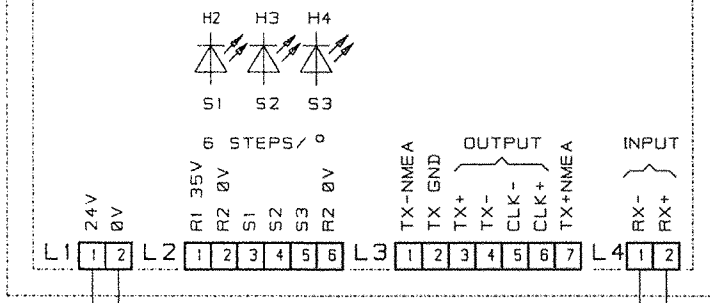
AWD-110-105-0-500 (OPTION)
CONNECTION BOX

NB03-930
MAINS FILTER



148-487
STEP/SSC MODULE

NB06-261
STEP/SSC PCB



110-233.HP010

05015859

CAD B 4516 D

	DATUM	NAME
2003	DATUM	NAME
BEARB	10.10.	KEMPMANN
GEPR	10.10.	
NORM	10.10.03	
FREIG	A / 16.06.03	

ZUST	ANDERUNG	DATUM	NAME
C	6494.110	10.10.03	KE
B	6477.110	01.09.03	KE
A		12.06.03	KE

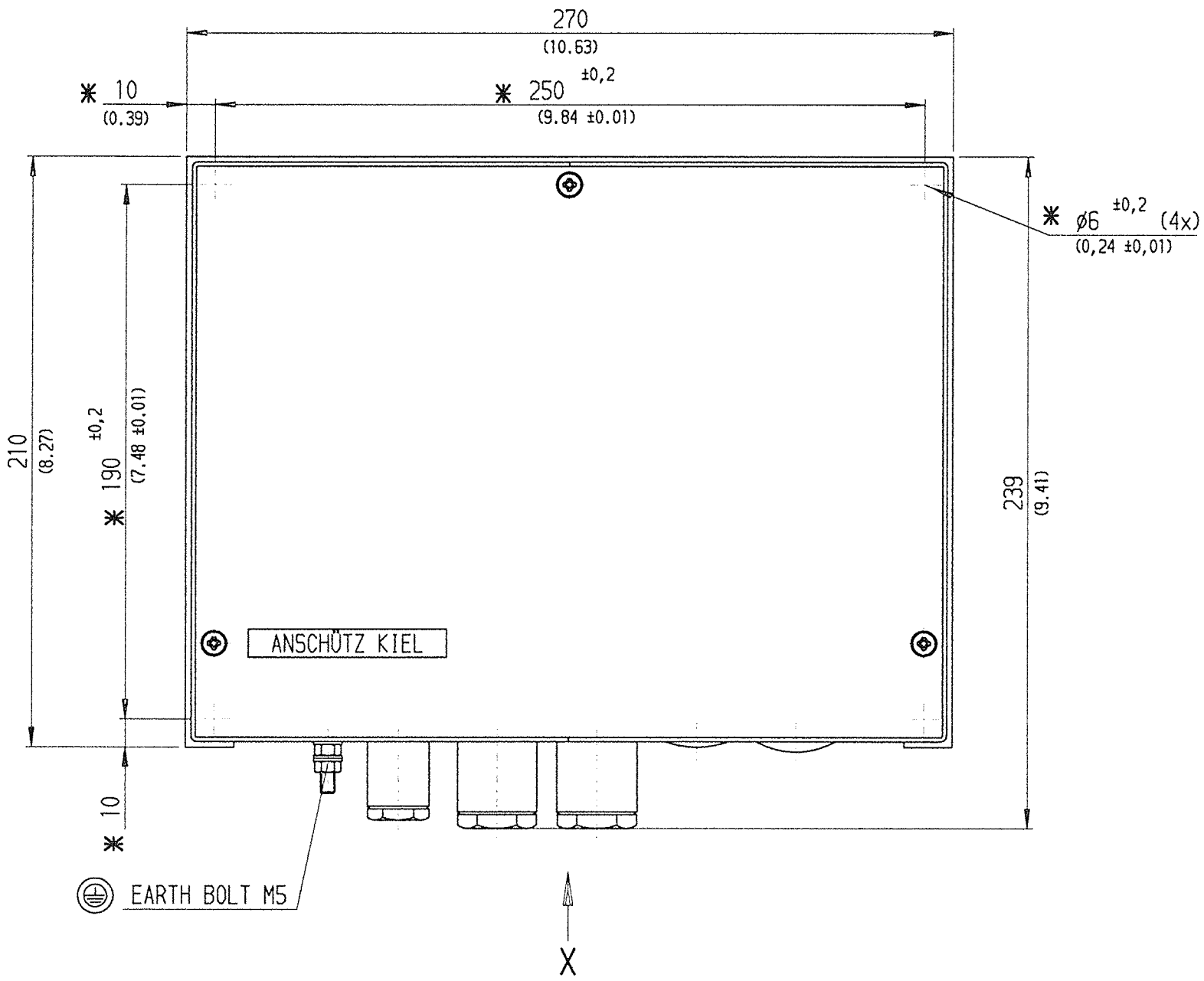
Raytheon Marine GmbH
Germany

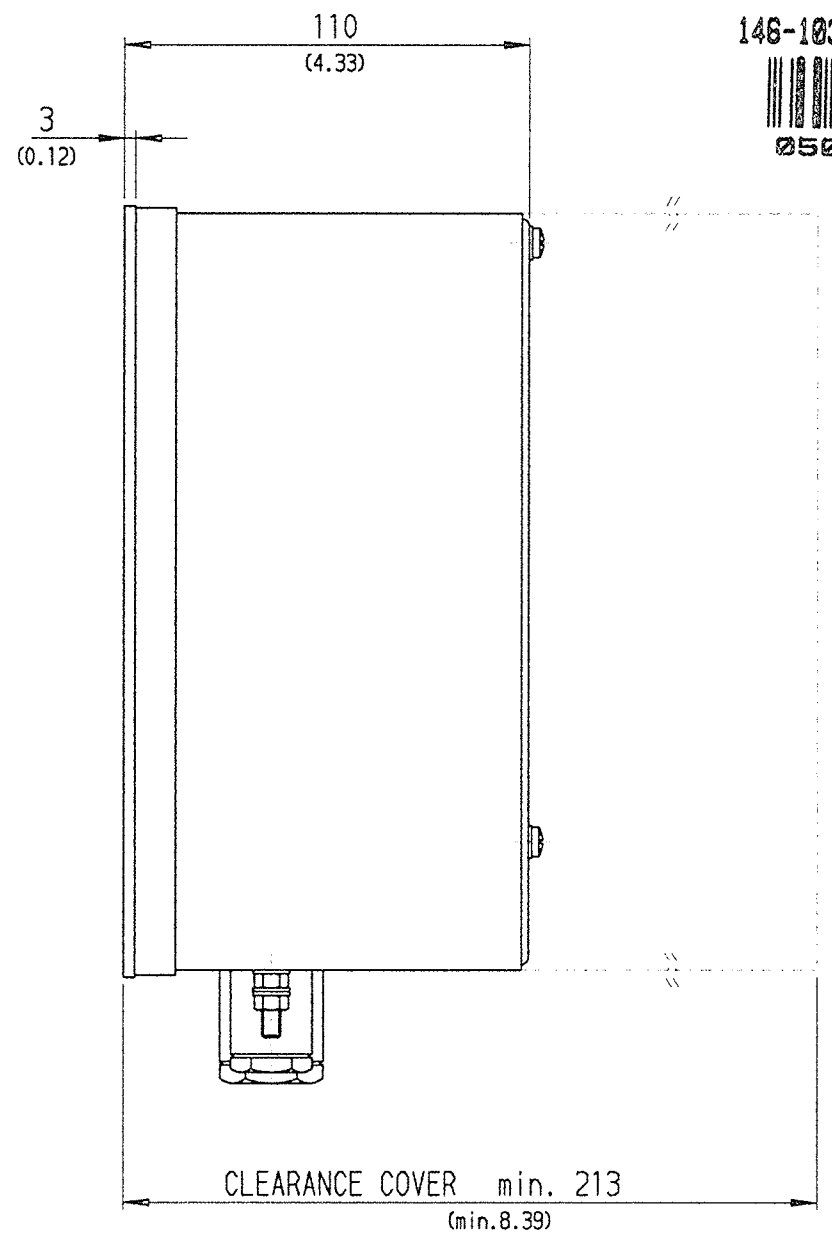
BENENNUNG
GYRO COMPASS STD.22 COMPACT
CABLE AND CONNECTION DIAGRAM

ZEICHNUNGSNUMMER
110-233.HP010

BL. 1
VON 1

ERS.FOR | ERS.DURCH



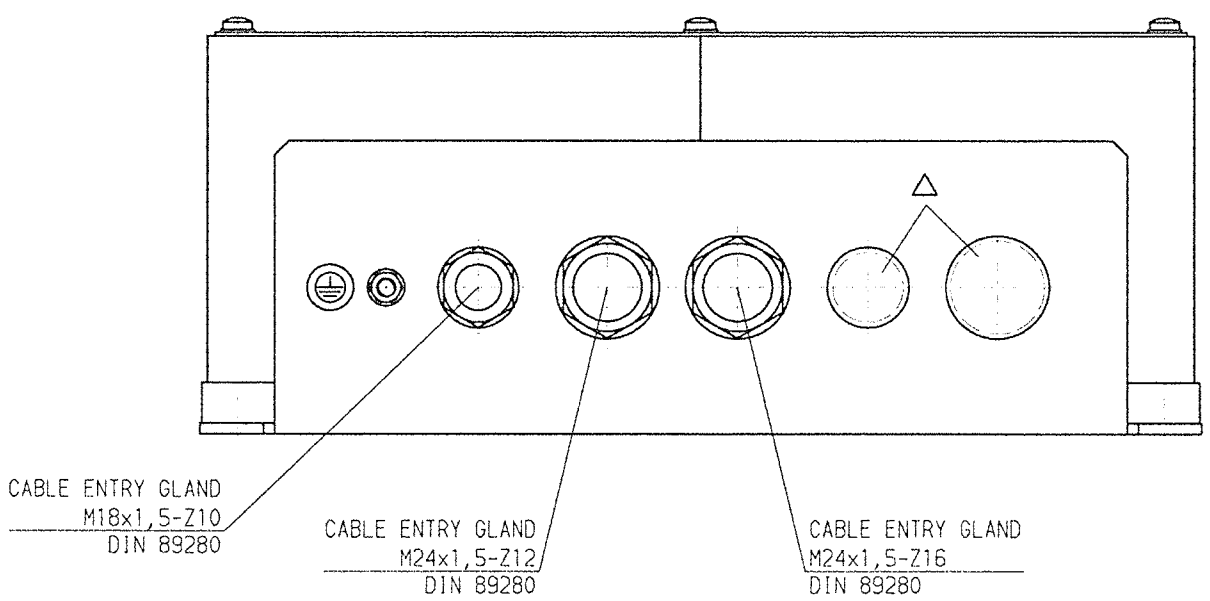


146-103.HP005

05016409

X

VIEW X



△ AS ACCESSORIES CAN BE COMPLETED

* REFERRING TO DRILLING SCHEME ON BOARD SHIP

TYPE OF ENCLOSURE : IP 22 EN 60529

ALL DIMENSIONS WITHOUT TOLERANCES ARE MAXIMUM DIMENSIONS

REV.	REVISIONS	DATE	NAME

CAD

mm
(INCH)

	DATE	NAME
2003		
DR.	17.9.	Haf
APPR.	19.9.	
CHK.	29.9	
RELEASE:	02.10.03	

Raytheon
Raytheon Marine GmbH
Germany

CAD / APK

SCALE –

WEIGHT: ≈2 Kg

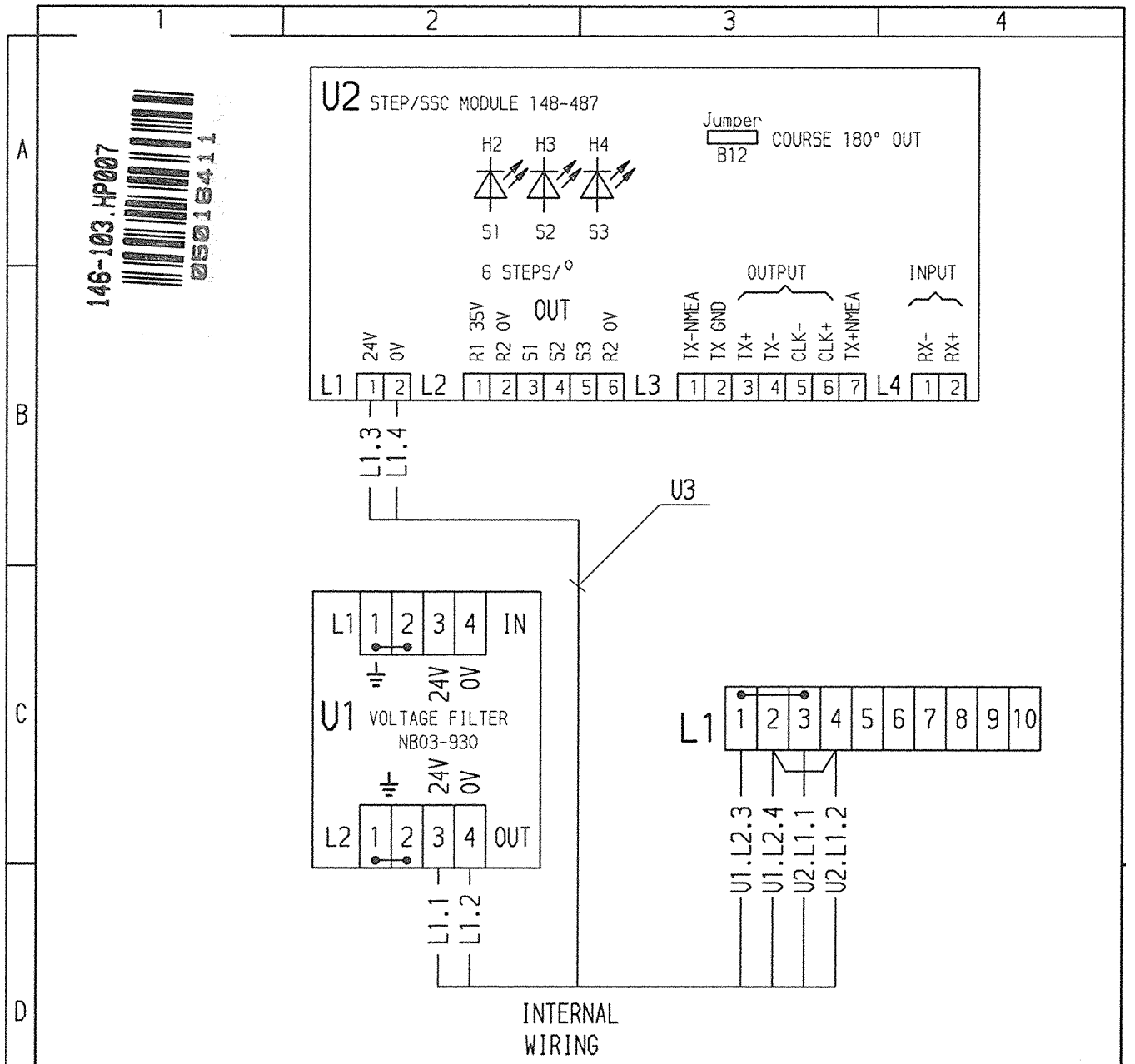
DRAWING TITLE:

ADDITIONAL OUTPUT BOX
DIMENSIONAL DRAWING

DRAWING NO.:

146-103.HP005

SH. 1
OF 1



Aderquerschnitt / CORE CROSS OF CABLE : 1 mm² sw AN2031-25

DIN CODE	BENENNUNG DESCRIPTION	TYP/ZEICHNUNGS-NR. TYPE/DRAWING NO:	POS.NO.	AUS STUECKLISTE FROM PARTS LIST
L1	TERMINAL STRIP	146-103.02	L1	146-103.
U1	VOLTAGE FILTER 24V	NB03-930	U1	146-103.
U2	STEP/SSC MODULE	148-487	U2	146-103.
U3	VERDRAHTUNG	146-103.03	4	146-103.

CAD / APK . .

CAD

Allgemeintoleranz
ISO 2768 - mK

Arbeitspause

Maßstab –

Zust.	Änderung	Datum	Name
.	.	.	.

	Datum	Name
2003		
Bearb.	17.9.	Haf
Gepr.	1.10.	
Norm	02.10.03	
Freigabe:	02.10.03	

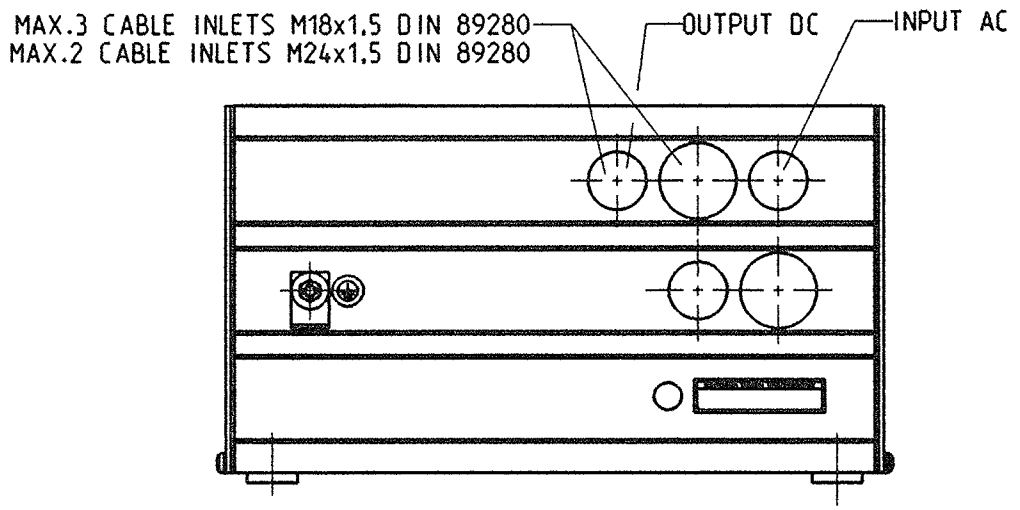
Raytheon
Raytheon Marine GmbH
Germany

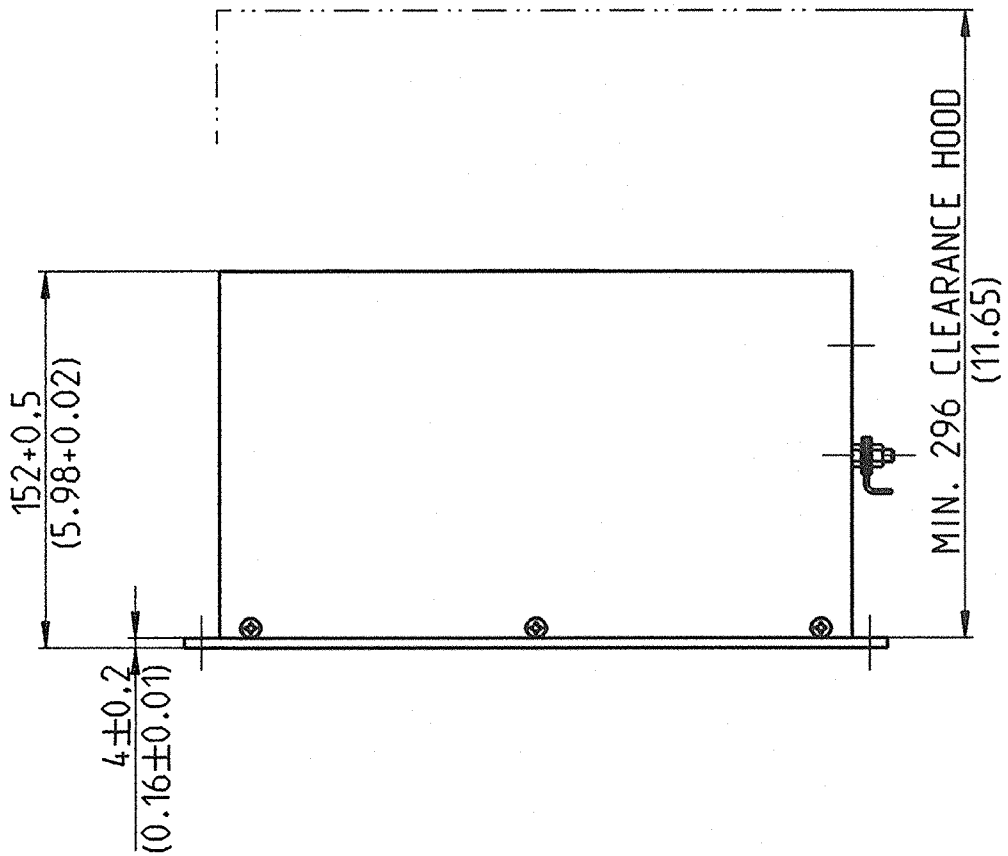
Benennung:
Bauschaltplan / WIRING DIAGRAM
ADDITIONAL OUTPUT BOX

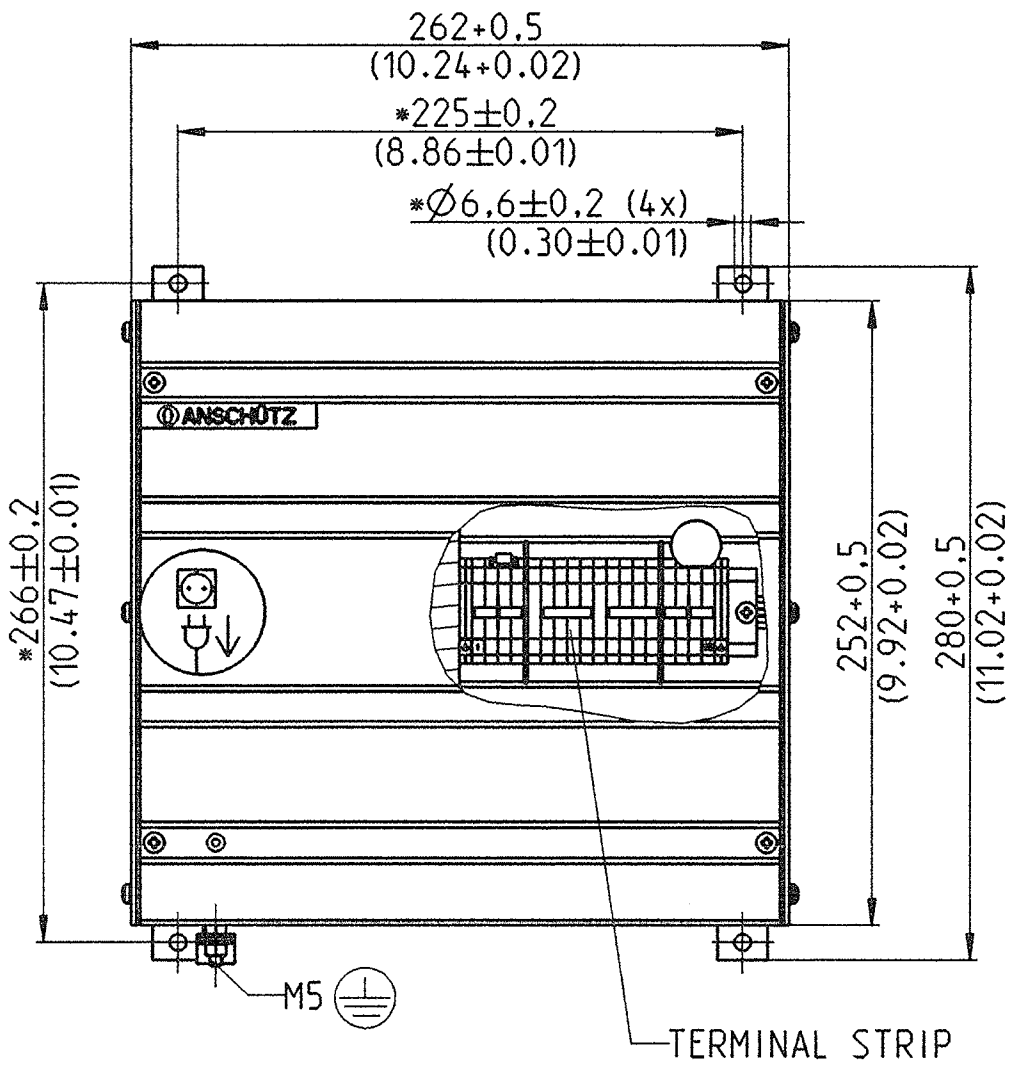
Zeichnungsnummer:
146-103.HP007

BL. 1
von 1

Ers. für . Ers. durch .







121-062.HP005

05014438

TYPE OF ENCLOSURE: EN 60529 IP22

* REFERRING TO DRILLING SCHEME ON BOARD

DIMENSIONS WITHOUT TOLERANCES ARE MAXIMUM DIMENSIONS

REV.	REVISIONS	DATE	NAME
A	1156.121	06.10.03	Zm

	DATE	NAME
DR.	15-Jul-02	Zm
APPR.	9.10.03	
CHK.	13.10.03	
RELEASE:	12.04.03	

Raytheon
Raytheon Marine GmbH
Germany

CAD

mm
(INCH)

SCALE

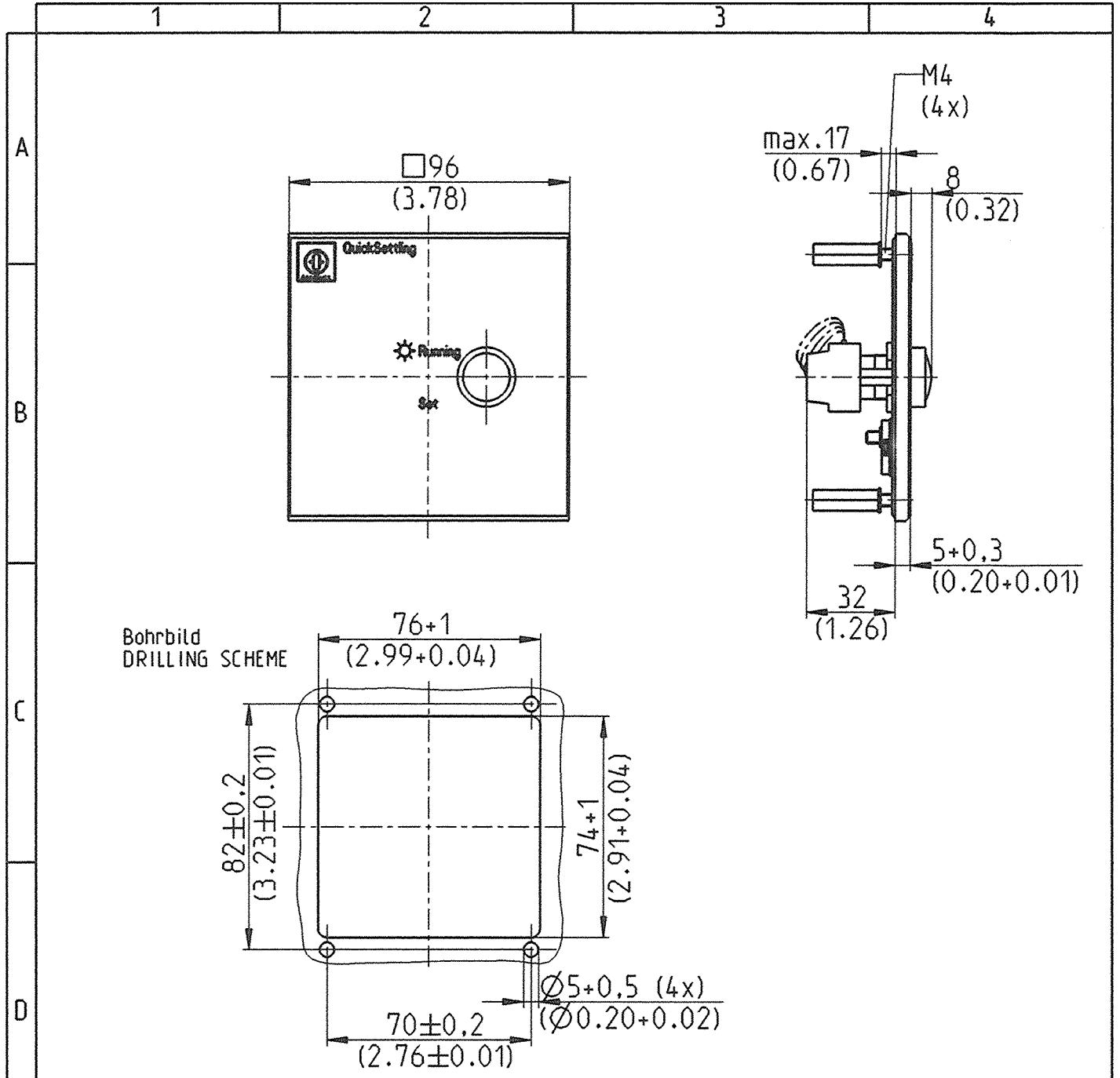
WEIGHT: ca. 5 Kg

DRAWING TITLE:

AC/DC-Converter
DIMENSIONAL DRAWING

DRAWING NO.: 121-062.HP005

SH. 1
OF 1



130-606.HP005

05012024

Schutzart EN 60529 IP23
TYPE OF ENCLOSURE

Maße ohne Toleranzangabe sind Größtmaße
DIMENSIONS WITHOUT TOLERANCES ARE MAXIMUM DIMENSIONS

							CAD	.
				mm / (INCH)	Arbeitspause	Maßstab	Gewicht: WEIGHT:	ca. 0.5 kg
Zust.	Änderung	Datum	Name	.	Datum	Name	Benennung:	
				Bearb.	28-Apr-00	Zm	Bediengerät Quick Settling/OPERATOR UNIT Q. S.	
				Gepr.	.		Maßzeichnung/DIMENSIONAL DRAWING	
				Norm	25.05.00	Hol.Sk		
				Freigabe	06.07.00	Pl.		
				Raytheon Raytheon Marine GmbH Germany			Zeichnungsnummer: 130 E 606.HP005	Bl. 1 von 1
							Ers. für .	Ers. durch .